Clinical Policy Bulletin:
YAG Laser in Ophthalmology:
Selected Indications

Number: 0354

Policy

Aetna considers Nd:YAG laser capsulotomy medically necessary when performed following cataract extraction (see CPB 0508 - Cataract Removal Surgery) in members with visually significant clouding (opacification) of the posterior portion of the membrane that surrounds the lens (the posterior capsule) according to the following selection criteria based on the clinical guidelines of an expert panel on cataract surgery convened by the Agency for Health Care Policy and Research (AHCPR, 1993):

I. After cataract removal in the same eye, unless the laser capsulotomy is scheduled at the same time as cataract removal surgery, or performed prophylactically.

II. When performed within 6 months of surgery only if one of the following medical necessity criteria is met:

A. The member has a best-corrected visual acuity (BCVA) of 20/50 or worse and both of the following conditions are met:
   1. The eye examination confirms that posterior capsular opacification is present; and
   2. The visual impairment has interfered with the member's ability to carry out needed or desired activities; or

B. The member has a BCVA of 20/40 or better and all of the following conditions are met:
   1. The eye examination confirms that posterior capsular opacification is present; and
   2. Visual disability fluctuates as a result of symptoms of glare or symptoms of decreased contrast; and
3. Visual disability has interfered with the member's ability to carry out needed or desired activities; or

C. When used for members with posterior capsular opacification regardless of functional impairment for any of the following reasons:

1. To provide better visualization of the posterior pole for members with:
   a. Diabetic retinopathy; or
   b. Macular disease; or
   c. Retinal detachment; or

2. To diagnose posterior pole tumors; or
3. To evaluate the optic nerve head.

If none of the above criteria is met, Nd:YAG laser capsulotomy performed within 6 months of cataract surgery is considered experimental and investigational because of a lack of evidence of the value of routine prophylactic capsulotomy following cataract surgery.

Note: Because posterior capsular opacification is uncommon within 6 months after cataract surgery, requests for Nd:YAG laser capsulotomy performed within 6 months of cataract surgery of the same eye may be subject to medical necessity review.

Aetna considers Nd:YAG laser peripheral iridotomy medically necessary for primary angle closure and primary angle-closure glaucoma.

Aetna considers ND-YAG laser goniotomy medically necessary for the treatment of primary congenital glaucoma.

Aetna considers Nd:YAG laser vitreolysis experimental and investigational for the treatment of vitreous degeneration and vitreous floaters because its effectiveness for these indications has not been established.

Aetna considers Nd:YAG laser anterior hyaloidotomy experimental and investigational for the treatment of trapped triamcinolone behind the lens after intra-vitreal injection because its effectiveness for this indication has not been established.

Aetna considers Nd:YAG laser peripheral iridotomy experimental and investigational for the prevention of pigment dispersion glaucoma because its effectiveness for this indication has not been established.

Aetna considers Nd:YAG laser posterior hyaloidotomy experimental and investigational for the clearance of pre-macular hemorrhages because its effectiveness for this indication has not been established.

Aetna considers Nd:YAG laser goniopuncture experimental and investigational for rescue of failed trabeculectomy because its effectiveness for this indication has not been established.
Background

The Agency for Health Care Policy and Research (AHCPR) panel concluded that laser capsulotomy should not be scheduled at the time cataract surgery is performed because one cannot predict whether a cataract surgery patient will develop posterior capsular opacification or the time at which any such opacification will occur. For similar reasons, manual removal of the posterior capsule, performed with a needle or hook (called corneo-scleral section), should not be routinely performed at the time of initial cataract surgery.

The AHCPR panel also concluded that neodymium:yttrium-aluminum-garnet (Nd:YAG) laser capsulotomy should not be performed prophylactically or scheduled routinely at particular times after cataract surgery.

The eye examination should confirm the diagnosis of posterior capsular opacification and exclude other ocular causes of functional impairment. The panel concurred with the finding of the literature review that there is yet no objective method of relating the degree of capsular opacification to the severity of functional impairment.

The panel also concluded that posterior capsular opacification rarely occurs within 3 months of surgery, and that it is uncommon for posterior capsular opacification to occur within the first 6 months of surgery. Therefore, any cases of Nd:YAG laser capsulotomy occurring within 6 months of cataract surgery should be reviewed, to ensure that Nd:YAG laser capsulotomy is reasonable and medically necessary.

In a single center retrospective study, Delaney and colleagues (2002) determined the effectiveness of Nd:YAG vitreolysis and pars plana vitrectomy in the treatment of vitreous floaters. A total of 31 patients (42 eyes) who underwent 54 procedures (Nd:YAG vitreolysis or pars plana vitrectomy) for the treatment of vitreous floaters were included in the study. Main outcome measures were percentage symptomatic improvement following treatment and incidence of post-operative complications. Statistical analysis was performed using the Fisher exact test. Posterior vitreous detachment was the primary cause of floaters in all 42 eyes with co-existing vitreous veils in 3 eyes and asteroid hyalosis in 2 eyes. Thirty-nine of 42 eyes received Nd:YAG vitreolysis; 38 % found Nd:YAG vitreolysis moderately improved their symptoms while 62 % found no improvement. After an average of 14.7 months follow-up, no post-operative complications were recorded. Fifteen eyes underwent a pars plana vitrectomy, 1 with combined phaco-emulsification and posterior chamber implantation and 11 following unsuccessful laser vitreolysis. Pars plana vitrectomy resulted in full resolution of symptoms in 93 % of eyes. One patient developed a post-operative retinal detachment which was successfully treated. The authors concluded that patients’ symptoms from vitreous floaters are often under-estimated resulting in no intervention. This paper showed Nd:YAG vitreolysis to be a safe but only moderately effective primary treatment conferring clinical benefit in 1/3 of patients.

Kirwan and Cahill (2011) reported on a case of successful drainage of a large pre-macular hemorrhage using laser photo-disruption of the posterior hyaloid
membrane. A 47-year old man presented acutely to the authors' emergency department complaining of a 24-hr history of sudden onset, painless and persistent loss of vision in his left eye. Immediately before noticing this loss of vision, he had been vomiting violently from excessive alcohol intake. The left visual acuity was counting fingers. Dilated fundoscopy of the left eye revealed a large pre-macular hemorrhage that was 14 disc diameters in size. Clotting investigations were normal. A diagnosis of valsalva retinopathy was made and the patient elected to receive a prompt Nd:YAG laser posterior hyaloidotomy as an outpatient. At 1 week follow-up, the hemorrhage had drained completely into the vitreous space revealing a healthy macula and the visual acuity had improved to 6/12 unaided. At 6-month follow-up the left visual acuity stabilized at 6/9 unaided. The authors concluded that Nd:YAG laser posterior hyaloidotomy is an useful outpatient procedure for successful clearance of large pre-macular hemorrhages that offers patients rapid recovery of visual acuity and the avoidance of more invasive intra-ocular surgery. The findings of this case study (with short-term follow-up) needs to be validated by well-designed studies.

In a prospective, randomized, controlled trial, Scott et al (2011) tested the hypothesis that Nd:YAG laser peripheral iridotomy (LPI) significantly reduces the incidence of conversion from pigment dispersion syndrome (PDS) with ocular hypertension (OHT) to pigmentary glaucoma (PG). A total of 116 eyes of 116 patients with PDS and OHT were used in this analysis. Patients were assigned randomly either to Nd:YAG LPI or to a control group (no laser). The primary outcome measure was conversion to PG within 3 years, based on full-threshold visual field (VF) analysis using the Ocular Hypertension Treatment Study criteria. Secondary outcome measures were whether eyes required topical anti-glaucoma medications during the study period and the time to conversion or medication. Fifty-seven patients were randomized to undergo laser treatment and 59 were randomized to no laser (controls). Age, gender, spherical equivalent refraction, and intra-ocular pressure at baseline were similar between groups. Outcome data were available for 105 (90 %) of recruited subjects, 52 in the laser treatment group and 53 in the no laser treatment group. Patients were followed-up for a median of 35.9 months (range of 10 to 36 months) in the laser arm and 35.9 months (range of 1 to 36 months) in the control arm. Eight eyes (15 %) in the laser group and 3 eyes (6 %) in the control group converted to glaucoma in the study period. The proportion of eyes started on medical treatment was similar in the 2 groups: 8 eyes (15 %) in the laser group and 9 eyes (17 %) in the control group. Survival analyses showed no evidence of any difference in time to VF progression or commencement of topical therapy between the 2 groups. Cataract extraction was performed on 1 patient in the laser group and in 1 patient in the control group during the study period (laser eye at 18 months; control eye at 34 months). The authors concluded that the findings of this study suggested that there was no benefit of Nd:YAG LPI in preventing progression from PDS with OHT to PG within 3 years of follow-up.

Ascaso and colleagues (2012) reported on the case of a 65-year old male who underwent intra-vitreal triamcinolone acetonide (IVTA) injection for treating a clinically significant macular edema (CSME) due to background diabetic retinopathy in his left eye. On the first post-operative day, visual acuity dropped from 20/80 to hand movements. Slit-lamp examination showed the drug between the posterior capsule of the lens and the anterior hyaloid face. Two weeks later,
visual acuity and the milky fluid seemed unchanged. Neodymium:yttrium-aluminum-garnet laser anterior hyaloidotomy was performed. One week later, slit-lamp examination of the retrolental space revealed the complete disappearance of triamcinolone and intra-ocular pressure remained stable. After a follow-up period of 2 months, visual acuity increased to 20/50 with the lens remaining clear. The authors concluded that Nd:YAG laser anterior hyaloidotomy is an effective, simple, useful and minimally invasive outpatient procedure in patients with persistent entrapment of triamcinolone behind the crystalline lens, allowing the drug to clear without trauma to the lens. The findings of this case study (with short-term follow-up) needs to be validated by well-designed studies.

Ramani et al (2009) examined the morphologic changes in the anterior segment of primary angle closure suspects (PACS) who underwent laser peripheral iridotomy (LPI) for a period of 2 years. Primary angle closure suspects (n = 82 eyes) of Asian Indian origin underwent A-scan biometry and ultrasound biomicroscopy. Anterior chamber depth, anterior chamber angle (ACA), axial length, lens thickness, relative lens position, central corneal thickness, angle opening distance 500, trabecular-ciliary process distance, iris-ciliary process distance, and iris thickness were measured before LPI and after LPI at 1 week, 6 months, 1 year, 1.5 years, and 2 years. Variation in the parameters measured over a period of 2 years was analyzed. Fifteen eyes out of 52 eyes developed into primary angle closure (PAC) with synechial changes. Uni-variate analysis for the predictive factors of PAC showed no significant association for age, sex, narrow angle, ultrasound biomicroscopy parameters, and vertical cup-disc ratio. When analyzed as continuous variables, decreasing ACA was significant risk factor (95% confidence interval [CI]: 0.703, 0.989, p = 0.037). Iris-ciliary process distance, ACA, lens thickness, and angle opening distance 500 were the parameters that varied significantly (p < 0.05) between "before LPI group" and "after LPI groups". None of the subjects developed increased intra-ocular pressure (IOP) after laser iridotomy. The authors concluded that in this hospital-based study on the course of PACS subjects after LPI, as many as 28 % progressed to PAC. Decreasing ACA was the predictive factor for the progression of PACS to PAC. There was no increase in IOP, history, or symptoms of acute attack of glaucoma among the study subjects after LPI.

In a case-series study, Lin and colleagues (2011) evaluated the long-term changes in anterior segment morphology by using ultrasound biomicroscopy (UBM) following LPI in eyes with PAC. A total of 54 eyes with PAC of 31 consecutive patients were enrolled. Routine ophthalmic and UBM examination were performed at visit-1 (before LPI), 2 weeks, 6, and 12 months after LPI. The parameters of anterior chamber were measured by UBM and calculated. Results of each follow-up time were analyzed using repeated measures analysis of variance. Parameters of UBM measurement at 750 µm anterior to the sclera spur and at 500 µm counterpart were compared using paired student t-test. Compared to before LPI, anterior chamber depth (ACD) was deepened by approximate 0.10 mm after LPI, however, it was not statistically significant (F = 3.50, p > 0.05). Angle opening distance (AOD), trabecular-iris angle (TIA), angle recess area (ARA) and trabecular-ciliary process distance (TCPD) were significantly increased at 2 weeks, 6 and 12 months after LPI compared with respective baseline [AOD750: (165.0 ± 70.3), (185.8 ± 68.5), (196.1 ± 77.7) µm versus (66.2 ± 51.6) µm, F = 92.60; TIA750: 14.1° ± 6.3°, 15.5° ± 6.2°, 16.4° ± 5.9° versus 6.4° ± 4.9°,
F = 92.60; ARA: (0.058 ± 0.024), (0.065 ± 0.023), (0.068 ± 0.026) mm(2) versus (0.025 ± 0.017) mm(2), F = 92.60; TCPD: (647.1 ± 113.0), (701.8 ± 93.4), (670.1 ± 95.4) µm versus (571.0 ± 97.2) µm, F = 34.00; p < 0.05]. The parameters of UMB measurement at 750 µm were significantly increased more than that at 500 µm anterior to the sclera spur (AOD: t = 5.90, TIA750: t = 2.70, p < 0.05; ARA: t = 2.00, p = 0.05). The authors concluded that LPI can significantly widen the peripheral anterior angle in eyes with PAC lasting for at least 1 year after LPI. Parameters detected by UBM at 750 µm anterior to the sclera spur appear to be more sensitive in evaluating the alternation of peripheral angle structure.

The American Academy of Ophthalmology’s Preferred practice pattern guidelines on “Primary angle closure” (AAO, 2010) stated that patients with PAC may have elevated IOP as a result of a chronic compromise of aqueous outflow due to appositional or synechial angle closure, or damage to the trabecular meshwork from previous intermittent acute angle-closure crisis. Iridotomy is indicated for eyes with PAC or primary angle-closure glaucoma (PACG).

A Medscape review on “Glaucoma, angle closure, chronic treatment & management” (Tham, 2012) stated that “Laser iridotomy is indicated for all stages of chronic angle-closure glaucoma (CACG). Laser iridotomy involves the creation of a hole in the peripheral iris by laser. The hole provides an alternative pathway for aqueous to flow from the posterior chamber into the anterior chamber, bypassing the pupil. Therefore, iridotomy will eliminate pupillary block and prevent forward bowing of the iris as a result of the pressure difference between the two chambers. Iridotomy will open those areas of the angle not involved by PAS (peripheral anterior synechiae) and prevent further synechial closure”.

Thomas and Walland (2013) noted that PACG and its precursors represent both a significant proportion of world glaucoma blindness and a currently insurmountable burden of treatment. In contrast to primary open-angle glaucoma, preventive interventions in primary angle closure disease (PACD) can sometimes be definitive. These investigators have synthesized data from randomized controlled trials (RCT’s) -- and where this is not available -- principles grounded in known biology, biological plausibility, logic, preferred practice and personal experience to develop detailed and explicit clinical algorithms for the management of the spectrum of PACD. Laser iridotomy is the mainstay of first-line intervention and is usually required for all PACD with the exception of some PACS. Laser iridotomy is a necessary but not always sufficient step and uncertainty arises where a patent iridotomy has not alleviated the angle closure profile or achieved clinically desired end points. The crucial step-wise considerations after iridotomy are: whether the angle is open or closed; whether the IOP can be medically controlled; the extent of PAS and the presence of visually significant cataract. These lead to further interventions that include iridoplasty, cataract surgery, trabeculectomy or phacotrabeculectomy. Such subsequent interventions are based on an arbitrary threshold (180 degrees) for angle opening and extent of PAS following iridotomy and other initial procedures.

Furthermore, an UpToDate review on “Angle-closure glaucoma” (Weizer, 2013) states that “Laser peripheral iridotomy is the first step in treatment of patients with chronic angle closure glaucoma, to relieve any pupillary block component. The intraocular pressure may remain elevated, however, if scarring has already
damaged the drainage angle. In this case, the remaining glaucoma is treated medically and surgically much as in open-angle glaucoma .... Patients with signs and symptoms suggesting an acute attack of angle-closure glaucoma require emergency treatment by an ophthalmologist .... We recommend emergency use of topical ophthalmic medications to reduce intraocular pressure (Grade 1C). These drugs may include a beta-blocker, an alpha agonist, and an agent to produce miosis. We also suggest systemic medication to decrease intraocular pressure, which may include oral or IV acetazolamide, IV mannitol, oral glycerol, or isosorbide (Grade 2C). Once the acute attack is controlled, definitive treatment for angle-closure glaucoma is a laser peripheral iridotomy to provide a small drainage hole through the iris”.

Susanna et al (2014) stated that there is an increasing need to prolong trabeculectomy success rates with minimally invasive procedures. In a prospective, non-comparative, interventional cohort study, these researchers examined the safety and effectiveness of Nd:YAG laser goniopuncture (LGP) in IOP in eyes having late bleb failure following trabeculectomy with mitomycin C administration. A total of 19 eyes of 19 patients with uncontrolled glaucoma after failed trabeculectomy were include in this study. All eyes had ischemic non-functioning blebs with patent internal ostia underwent Nd:YAG LGP, followed by a 5-fluorouracil injection. Main outcome measures were IOP and the number of anti-glaucoma medications before and after the procedure, as well as pre-surgical and post-surgical appearance of the blebs, using the Indiana Bleb Appearance Grading Scale classification. The mean (SD) time of LGP after trabeculectomy was 35.7 (32.3) months, and the mean (SD) follow-up period after LGP was 6.0 (1.1) months (range of 4.4 to 8.4 months). The mean (SD) IOP had decreased from 20.9 (4.5) mm Hg (range of 15.5 to 29.0 mm Hg) to 11.9 (4.1) mm Hg (range of 5.0 to 21.0 mm Hg) (p < 0.001). The only complications observed after LGP were 2 cases of hypotony, which resolved spontaneously. Compared with baseline Indiana Bleb Appearance Grading Scale classifications, 2 eyes showed an increase in bleb height and 10 eyes showed an increase in bleb extension. None of the eyes had a positive Seidel test result. The mean (SD) number of hypotensive agents per eye had decreased from 0.7 (1.1) to 0.3 (0.7) after the procedure. At the last follow-up visit, 15 eyes (79 %) had achieved an IOP of 15 mm Hg or less, with a minimum IOP reduction of 20 % from baseline without medication use. The authors concluded that the Nd:YAG LGP is a safe and effective procedure for lowering IOP in eyes with ischemic non-functioning blebs and patent trabeculectomy ostia. They stated that this is a promising solution to rescue failed trabeculectomies and can potentially prolong trabeculectomy success rates.

Guidelines from the World Glaucoma Association (2013) on childhood glaucoma state that angle surgery (goniotomy and trabeculotomy – conventional or circumferential) is the procedure of choice for primary congenital glaucoma with the exact choice dictated by corneal clarity and the surgeon’s experience and preference. The guidelines state that angle surgery success rates for secondary childhood glaucomas are generally not as good as for primary congenital glaucoma (PCG) with certain exceptions [e.g., glaucoma with acquired condition (uveitis) in juvenile idiopathic arthritis (JIA)].
In a Cochrane review, Ghate and Wang (2015) compared the safety and effectiveness of different surgical techniques for primary congenital glaucoma (PCG). These investigators searched CENTRAL (which contains the Cochrane Eyes and Vision Group Trials Register) (The Cochrane Library 2014, Issue 6), Ovid MEDLINE, Ovid MEDLINE In-Process and Other Non-Indexed Citations, Ovid MEDLINE Daily, Ovid OLDMEDLINE (January 1946 to June 2014), EMBASE (January 1980 to June 2014), (January 1982 to June 2014), PubMed (January 1946 to June 2014), the metaRegister of Controlled Trials (mRCT) (www.controlled-trials.com), ClinicalTrials.gov (www.clinicaltrials.gov), the WHO International Clinical Trials Registry Platform (ICTRP) (www.who.int/ictrp/search/en). They did not use any date or language restrictions in the electronic searches for trials. They last searched the electronic databases on June 23, 2014. These researchers included all randomized and quasi-randomized trials in which different types of surgical interventions were compared in children less than 5 years of age with PCG. They used standard methodological procedures specified by The Cochrane Collaboration. A total of 6 trials (4 randomized and 2 quasi-randomized) with 102 eyes in 61 children were included in this analysis. Two trials were conducted in the USA and 1 trial each in Egypt, Israel, Lebanon and Saudi Arabia. All trials included children aged younger than 1 year when diagnosed with PCG, and followed them for periods ranging from 6 months to 5 years. No 2 trials compared the same pair of surgical interventions, so these researchers did not perform any meta-analysis. One trial compared trabeculotomy versus goniotomy; a 2nd trial compared combined trabeculectomy-trabeculotomy with mitomycin C versus trabeculectomy-trabeculotomy with mitomycin C and deep sclerectomy; a 3rd trial compared combined trabeculotomy-trabeculectomy versus trabeculotomy; a 4th trial compared 1 goniotomy versus 2 goniotomies; a 5th trial compared trabeculotomy versus viscocanalostomy; and the 6th trial compared surgical goniotomy versus neodymium-YAG laser goniotomy. For IOP change and surgical success (defined by IOP achieved), none of the trials reported a difference between pairs of surgical techniques. However, due to the limited sample sizes for all trials (average of 10 children per trial), the evidence as to whether a particular surgical technique is effective and which surgical technique is better, still remains uncertain. Adverse events, such as choroidal detachment, shallow anterior chamber and hyphema, were reported from 4 trials. None of the trials reported quality of life or economic data. Overall, these trials were neither designed nor reported well. Two trials were quasi-randomized trials and judged to have high risk of selection bias; 4 trials were at unclear or high risk for performance bias and detection bias; and these investigators judged 1 trial to have high risk of attrition bias due to high proportions of losses to follow-up. Due to poor study design and reporting, the reliability and applicability of evidence remain unclear. The authors concluded that no conclusions could be drawn from the trials included in this review due to paucity of data. They stated that more research is needed to determine which of the many surgeries performed for PCG are effective.

CPT Codes / HCPCS Codes / ICD-9 Codes

Nd: YAG laser capsulotomy or hyaloidotomy.
CPT codes covered if selection criteria are met:

66821  Discission of secondary membranous cataract (opacified posterior lens capsule and/or anterior hyaloid); laser surgery (e.g., YAG laser) (one or more stages)

Other CPT codes related to the CPB:

66830 - 66984  Removal cataract
67028  Intravitreal injection of a pharmacologic agent (separate procedure)

Other HCPCS codes related to the CPB:

J3301  Injection, triamcinolone acetonide, not otherwise specified

ICD-9 codes covered if selection criteria are met:

366.50 - 366.53  After cataract

Other ICD-9 codes related to the CPB:

366.00 - 366.46, 366.8 - 366.9  Cataract
371.00 - 371.03  Corneal opacities
371.03
743.30 - 743.39  Congenital cataract and lens anomalies
743.39
996.51  Mechanical complication due to corneal graft
V45.61  Cataract extraction status

N\(\text{d}: \text{YAG laser vitreolysis}:\)

CPT codes not covered for indications listed in the CPB:

67031  Severing of vitreous strands, vitreous face adhesions, sheets, membranes or opacities, laser surgery (1 or more stages)

ICD-9 codes not covered for indications listed in the CPB:

379.21  Vitreous degeneration
379.24  Vitreous floaters

N\(\text{d}: \text{YAG laser peripheral iridotomy}:\)

Other CPT codes not covered for indications listed in the CPB:
ICD-9 codes covered if selection criteria are met:

365.06 Primary angle closure without glaucoma damage
365.20 - 365.24 Primary angle-closure glaucoma
365.13 Pigmentary glaucoma [pigment dispersion]

Other ICD-9 codes related to the CPB:

66250 Revision or repair of operative wound of anterior segment, any type, early or late, major or minor procedure

Other CPT codes related to the CPB:

65855 Trabeculoplasty by laser surgery, 1 or more sessions (defined treatment series)

The above policy is based on the following references: