Photocoagulation, Panretinal

ACG: A-0193 (AC)
Link to Codes

MCG Health
Ambulatory Care
30th Edition

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Clinical Indications

- Panretinal photocoagulation may be indicated for **1 or more** of the following:
  - Iris neovascularization(8)(9)N
  - Ischemic central retinal vein occlusion with secondary neovascularization(10)(11)N
  - Neovascular glaucoma(1)(8)(9)(13)N
  - Proliferative diabetic retinopathy[A](1)(8)(16)(17)(18)(19)N
  - Proliferative sickle retinopathy[B](25)(26)N
  - Retinopathy of prematurity,[C] as indicated by **1 or more** of the following(28)(31)(32)(33)(34):N
    - Retinal zone I at any stage with plus disease[D]
    - Retinal zone I at stage 3 in absence of plus disease[D]
    - Retinal zone II at stage 2 or 3 with plus disease[D]
  - Severe nonproliferative diabetic retinopathy, as indicated by microaneurysms and **1 or more** of the following(2)(43):N
    - Intraretinal hemorrhages in each of 4 quadrants(44)
    - Intraretinal microvascular abnormalities (eg, cotton-wool spots) in more than one quadrant
    - Venous beading in more than 2 quadrants

Alternatives

- Alternatives include(1):
  - Antiangiogenic therapy with vascular endothelial growth factor inhibitor for diabetic retinopathy. See Aflibercept AC, Bevacizumab AC, and Ranibizumab AC for further information.(6)(45)(46)
  - Antiangiogenic therapy with vascular endothelial growth factor inhibitor for retinopathy of prematurity. See Aflibercept AC for further information.(42)
  - Cryotherapy when blood or corneal haziness obscures view of retina, making laser use impossible in retinopathy of prematurity(35)(47)
  - Focal laser. See Focal Laser Treatment AC for further information.(43)
  - Photocoagulation for macular disease. See Photocoagulation, Macular Disease AC for further information.
  - Photodynamic therapy. See Photodynamic Therapy with Verteporfin AC for further information.
  - Vitrectomy(2)(3)(36)(43)

Evidence Summary

Background

Panretinal photocoagulation, also called scatter photocoagulation, is a laser photocoagulation technique used for the treatment of proliferative and severe nonproliferative diabetic retinopathy.(1)(2) **(EG 2)** Panretinal photocoagulation indirectly treats neovascularization on the optic nerve, retinal surfaces, or in the anterior chamber angle by applying hundreds of laser burns throughout the peripheral retina, reducing the amount of ischemic retina that drives angiogenesis.(3)(4) **(EG 2)** Potential complications include exudative retinal detachments, peripheral visual field loss, exacerbation of macular edema, impaired night vision, and loss of contrast sensitivity.(5)(6)(7) **(EG 2)**

Criteria

The evidence for the clinical indications found in this guideline includes 31 published peer reviewed articles, 4 specialty society or other evidence-based guidelines, 2 Cochrane systematic reviews, and 6 book sections.

For iris neovascularization, evidence demonstrates a net benefit, but of less than moderate certainty, and may consist of a consensus opinion of experts, case studies, and common standard care. **(RG A2)** Preventive treatment of iris neovascularization with panretinal photocoagulation can prevent closure of the anterior chamber angle and the development of neovascular glaucoma.(8) **(EG 2)**

For ischemic central retinal vein occlusion with secondary neovascularization, evidence demonstrates at least moderate certainty of at least moderate net benefit. **(RG A1)** A systematic review of treatment of central retinal vein occlusion identified 3 randomized controlled trials of panretinal laser photocoagulation and reported that prophylactic use did not prevent angle or iris (ie, anterior segment) neovascularization in ischemic central retinal vein occlusion; however, once neovascularization was present, panretinal laser photocoagulation led to regression of angle and iris neovascularization and reduced progression to neovascular glaucoma. Panretinal photocoagulation was not found to be beneficial in nonischemic central retinal vein occlusion; its use was associated with worsening of the visual fields.(11) **(EG 1)** Panretinal laser photocoagulation is considered the definitive treatment for neovascularization secondary to central retinal vein occlusion. Neovascularization of the optic disc or other retinal site should also be treated with panretinal laser photocoagulation to prevent anterior segment neovascularization.(10)(12) **(EG 2)**

For neovascular glaucoma, evidence demonstrates a net benefit, but of less than moderate certainty, and may consist of a consensus opinion of experts, case studies, and common standard care. **(RG A2)** Panretinal photocoagulation is the initial therapy in neovascular glaucoma. It decreases anterior and posterior segment neovascularization and decreases the intraocular pressure elevation; in eyes that have advanced synechial angle closure of the anterior chamber and remaining vision, panretinal photocoagulation may prevent further vision loss while awaiting surgery.(8) **(EG 2)** A specialty society guideline indicates that neovascular glaucoma should be treated with panretinal photocoagulation.(1) **(EG 2)**

For proliferative diabetic retinopathy, evidence demonstrates at least moderate certainty of at least moderate net benefit. **(RG A1)** Panretinal photocoagulation is a cornerstone of treatment in patients with proliferative diabetic retinopathy.(3)(20) **(EG 2)** A systematic review of 5 studies involving 4786 patients with proliferative diabetic retinopathy concluded that panretinal photocoagulation reduced the risk of severe visual loss by over 50% at 12 months and was associated with decreased progression of diabetic retinopathy.(21) **(EG 1)** For proliferative diabetic retinopathy that is high risk, the Diabetic Retinopathy Study demonstrated that panretinal photocoagulation reduced the risk of severe visual loss by more than 50% in eyes with high-risk proliferative diabetic retinopathy, defined as neovascularization originating from the optic disc greater than 1/3 disc diameter, any neovascularization originating from the optic disc with hemorrhage, and neovascularization originating from the retina with vitreous hemorrhage.(22)(23) **(EG 1)** An international practice guideline notes that panretinal photocoagulation is the treatment of choice for patients with newly diagnosed proliferative diabetic retinopathy.(17) **(EG 2)**

For proliferative sickle retinopathy, evidence demonstrates a net benefit, but of less than moderate certainty, and may consist of a consensus opinion of experts, case studies, and common standard care. **(RG A2)** A systematic review of 3 randomized controlled trials (414 eyes of 339 children and adults) found that, compared with no treatment, laser photocoagulation may prevent sight-threatening complications in eyes with proliferative sickle retinopathy, based on low-certainty to very low-certainty evidence. However, laser photocoagulation had no effect on other clinical outcomes such as the regression or development of new proliferative sickle retinopathy. (27) **(EG 1)** An expert specialty consensus recommends that patients with proliferative sickle retinopathy be evaluated for possible laser photocoagulation therapy.(25) **(EG 2)**

For retinopathy of prematurity, evidence demonstrates at least moderate certainty of at least moderate net benefit. **(RG A1)** Treatment of retinopathy of prematurity involves ablation of avascular retina, commonly by cryotherapy or laser photocoagulation.(28)(35) **(EG 2)** Compared with cryotherapy, laser treatment is less traumatic to surrounding tissues, causes less discomfort, is more effective in areas of the eye that are difficult to treat such as zone 1, and has a lower incidence of complications such as intraocular hemorrhage.(36)(37) **(EG 2)** The aim of laser treatment is to apply burns throughout the peripheral nonvascularized retina, usually in a single session in order to ensure treatment completion, which may be prevented in cases of postlaser hyphema or vitreous hemorrhage should treatment be divided into more than one session.(38) **(EG 2)** Multiple studies verify that laser treatment has better structural and functional outcomes as compared with cryotherapy.(28)(37) **(EG 2)** Plus disease is now the primary indication for laser treatment in retinopathy of prematurity.(39) **(EG 2)** Zones and stages of retinopathy of prematurity are of secondary importance in determining whether laser

treatment is needed.(39) **(EG 2)** While therapy with vascular endothelial growth factor inhibitors may be appropriate for treating retinopathy of prematurity, the results from randomized clinical trials comparing these agents with laser therapy have been mixed.(40)(41)(42) **(EG 2)**

For severe nonproliferative diabetic retinopathy, evidence demonstrates a net benefit, but of less than moderate certainty, and may consist of a consensus opinion of experts, case studies, and common standard care. **(RG A2)** A specialty society guideline states that panretinal laser photocoagulation may be used for select patients with severe nonproliferative diabetic retinopathy.(18) **(EG 2)** Another specialty society consensus guideline notes that, although the data are mixed regarding the long-term effectiveness of panretinal photocoagulation for patients with nonproliferative diabetic retinopathy, it may be beneficial for select patients, particularly those who have difficulty maintaining regularly scheduled appointments.(44) **(EG 2)**

Rationale

Use of this MCG care guideline helps the clinician determine if a particular treatment, medication, or service might be appropriate for a specific patient, taking into account their unique health complexities.

Use of these evidence-based clinical criteria to support decision making benefits the patient by identifying patient-specific complex clinical factors and conditions, promoting personalized treatment. Utilizing evidence-based clinical criteria promotes patient safety by helping ensure that potential patient benefits outweigh the risks. In addition, the use of evidence-based guidelines can increase consistency in treatment thresholds, leading to less variation in care and promoting equitable treatment among patients.

Related CMS Coverage Guidance

This guideline supplements but does not replace, modify, or supersede existing Medicare regulations or applicable National Coverage Determinations (NCDs) or Local Coverage Determinations (LCDs).

Code of Federal Regulations (CFR): 42 CFR 419.22(48); 42 CFR 422.101(49)

Internet-Only Manual (IOM) Citations: CMS IOM Publication 100-02, Medicare Benefit Policy Manual, Chapter 14 - Medical Devices(50); CMS IOM Publication 100-02, Medicare Benefit Policy Manual, Chapter 15 - Covered Medical and Other Health Services(51); CMS IOM Publication 100-02, Medicare Benefit Policy Manual, Chapter 16 - General Exclusions from Coverage(52)

Medicare Coverage Determinations: Medicare Coverage Database(53)

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Footnotes

[A] Proliferative diabetic retinopathy includes abnormal, highly permeable new vessels of the retina, optic disc, or iris, and vitreous hemorrhage.(2)(3)(14)(15) [A in Context Link 1]

[B] Proliferative sickle retinopathy is caused by the occlusion of the peripheral retinal vasculature, which leads to retinal ischemia and proliferation of new blood vessels.(24) [B in Context Link 1]

[C] Retinopathy of prematurity is a disorder of premature low-birth-weight infants characterized by the development of abnormal blood vessel growth, scarring, and, ultimately, retinal detachment and blindness.(28) In retinopathy of prematurity, plus disease is defined as at least 2 quadrants of dilation and tortuosity of the posterior retinal blood vessels, as compared with reference photographs.(29)(30)(31) [C in Context Link 1]

[D] Plus disease is defined as at least 2 quadrants of dilation and tortuosity of the posterior retinal blood vessels.(29) [D in Context Link 1, 2, 3]

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