Photocoagulation, Panretinal

ACG: A-0193 (AC)
Link to Codes

MCG Health
Ambulatory Care
27th Edition

Clinical Indications for Procedure

- Panretinal photocoagulation may be indicated for **1 or more** of the following:
  - Iris neovascularization(9)(10)N
  - Ischemic central retinal vein occlusion with secondary neovascularization(11)(12)N
  - Neovascular glaucoma(1)(9)(10)(14)N
  - Proliferative diabetic retinopathy[A](1)(3)(16)(17)(18)N
  - Proliferative sickle retinopathy[B](24)(25)N
  - Retinopathy of prematurity,[C] as indicated by **1 or more** of the following(27)(30)(31)(32)(33):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)(40):N
    - Intraretinal hemorrhages in each of 4 quadrants
    - Intraretinal microvascular abnormalities (eg, cotton-wool spots) in more than one quadrant
    - Venous beading in more than 2 quadrants

Alternatives to Procedure

- Alternatives include(1)(3):
  - Antiangiogenic therapy with vascular endothelial growth factor inhibitor for diabetic retinopathy.(7)(41)(42) See Aflibercept AC, Bevacizumab AC, and Ranibizumab AC for further information.
  - Cryotherapy when blood or corneal haziness obscures view of retina, making laser use impossible in retinopathy of prematurity(34)(43)
  - Focal laser.(40) See Focal Laser Treatment AC for further information.
  - 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)(4)(35)(40)

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)(3) **(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)(5) **(EG 2)** Potential complications include exudative retinal detachments, peripheral visual field loss, exacerbation of macular edema, impaired night vision, and loss of contrast sensitivity.(6)(7)(8) **(EG 2)**

Criteria

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.(9) **(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.(12) **(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.(11)(13) **(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.(9) **(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.(4)(19) **(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.(20) **(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.(21)(22) **(EG 1)**

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 2 randomized controlled trials (341 eyes) found, at a median follow-up of 21 to 47 months, that laser photocoagulation treatment may prevent the loss of vision and the occurrence of vitreous hemorrhages in eyes with proliferative sickle retinopathy compared with no treatment. However, laser photocoagulation had no effect on other clinical outcomes such as the regression or development of new proliferative sickle retinopathy.(26) **(EG 1)** An expert specialty consensus recommends that patients with proliferative sickle retinopathy be evaluated for possible laser photocoagulation therapy.(24) **(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, either by cryotherapy or laser photocoagulation.(27)(34) **(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.(35)(36) **(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.(37) **(EG 2)** Multiple studies verify that laser treatment has better structural and functional outcomes as compared with cryotherapy.(27)(36) **(EG 2)** Plus disease is now the primary indication for laser treatment in retinopathy of prematurity.(32) **(EG 2)** Zones and stages of retinopathy of prematurity are of secondary importance in determining whether laser treatment is needed.(32) **(EG 2)** The safety and efficacy of therapy with vascular endothelial growth factor inhibitors to treat retinopathy of prematurity await the results of randomized clinical trials, which are under way.(36)(38)(39) **(EG 2)**

For severe nonproliferative diabetic retinopathy, evidence demonstrates at least moderate certainty of at least moderate net benefit. **(RG A1)** A US specialty society guideline notes that the Early Treatment Diabetic Retinopathy Study compared early panretinal photocoagulation with deferral of panretinal photocoagulation (which was defined as careful follow-up at 4-month intervals and prompt panretinal photocoagulation if progression to high-risk proliferative diabetic retinopathy occurred).(1) **(EG 2)** The Early Treatment Diabetic Retinopathy Study suggested that panretinal photocoagulation is not recommended for eyes with mild or moderate nonproliferative diabetic retinopathy, provided that follow-up can be maintained(1); a UK specialty society guideline concurs.(3) **(EG 2)** Additional Early Treatment Diabetic Retinopathy Study analyses suggested that use of panretinal photocoagulation prior to the development of high-risk proliferative diabetic retinopathy is particularly appropriate for patients with type 2 diabetes.(1) **(EG 2)** The risk of severe vision loss or vitrectomy was reduced by 50% in those who were treated early compared with those treated with deferral until high-risk proliferative diabetic retinopathy developed.(1)(40) **(EG 2)**

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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)(4)(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.(23) [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.(27) 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.(28)(29)(30) [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.(28) [D in Context Link 1, 2, 3]

Codes

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