

AMERICAN ACADEMY OF PEDIATRICS

Sections on Endocrinology and Ophthalmology

Screening for Retinopathy in the Pediatric Patient With Type 1 Diabetes Mellitus

BACKGROUND

Diabetic retinopathy, a specific vascular complication of diabetes mellitus, is the leading cause of new cases of legal blindness in patients 20 to 74 years of age in the United States. The prevalence of retinopathy is related directly to the duration of diabetes. Nearly all patients with type 1 diabetes mellitus eventually develop some degree of retinopathy.¹ Two forms of diabetes are recognized: type 1 (insulin-dependent) and type 2 (noninsulin-dependent). Patients with type 1 diabetes have a higher risk of developing severe proliferative retinopathy leading to visual loss.²⁻⁵

PURPOSE

The primary purpose of this statement is to establish an evaluation schedule that provides optimal preventive care and management for pediatric patients with type 1 diabetes mellitus.

GOALS

1. Identify the pediatric patient at risk for developing diabetic retinopathy.
2. Establish an appropriate referral pattern for ophthalmologic examination.
3. Maximize treatment effects by meeting these two goals.
4. Generate a cost-effective, best-quality examination schedule.
5. Educate and engage the pediatric patient and his/her family in the management of diabetes, including the potential benefit of tight control.

RATIONALE FOR EXAMINATION

1. The Diabetic Retinopathy Study⁶
2. The Early Treatment Diabetic Retinopathy Study⁷
3. The Diabetic Retinopathy Vitrectomy Study⁸
4. The Diabetes Control and Complications Trial^{9,10}

The first three studies proved that laser photocoagulation surgery, although not able to reverse the disease process, can prevent additional visual loss and significantly prolong the period of useful vision.¹¹ The Diabetes Control and Complications Trial demonstrated that an intensive diabetes care regimen resulting in improved glucose control reduces the appearance and progression of diabetic retinopathy.^{9,10}

The recommendations in this statement do not indicate an exclusive course of treatment or serve as a standard of medical care. Variations, taking into account individual circumstances, may be appropriate. PEDIATRICS (ISSN 0031 4005). Copyright © 1998 by the American Academy of Pediatrics.

RATIONALE FOR OPHTHALMOLOGIC EXAMINATION FOR DIABETIC RETINOPATHY

The American Diabetes Association recommends annual screening for retinopathy 5 years after the onset of diabetes. Screening generally is not recommended before the onset of puberty.¹ These recommendations are for the adult patient with type 1 diabetes. We recommend consideration of an earlier referral of 3 to 5 years after diagnosis if the patient is >9 years of age, for the following reasons:

1. The ophthalmologist is more likely to detect changes of diabetic retinopathy than a nonophthalmologist.¹² Only 12% of patients in a major health maintenance organization were referred to an ophthalmologist.¹³
2. The ophthalmologist has an important role in preventive care by counseling the patient and family on the importance of good control and early intervention.
3. Earlier referral before the onset of retinopathy may be less traumatic for the patient and family.
4. Earlier studies emphasized the low risk for diabetic complications in prepubertal children. However, several recent reports found that both prepubertal and pubertal duration of disease are important factors in the development of diabetic retinopathy.^{14,15}

The examination schedule in the Table is suggested for the pediatric patient (0 to 20 years of age) with type 1 diabetes who is asymptomatic (without known ophthalmologic disease).

TABLE. Suggested Ophthalmologic Examination Schedule for Asymptomatic Pediatric Patient With Type I Diabetes

Initial Discussion
Within the first year after diagnosis, child and/or parents should receive counseling by a pediatrician or pediatric endocrinologist, regarding the need for ophthalmologic examination and early intervention
Initial examination by the ophthalmologist*
3-5 years after diagnosis if >9 years of age
Follow-up examination**
Annually
During pregnancy
During first trimester, then every 3 months until delivery

* Poor control or deterioration may dictate an earlier initial examination. An ophthalmologic examination also should be performed in poorly controlled patients before intensification of therapy.^{16,17}

** Abnormal findings will dictate more frequent follow-up examinations.

INITIAL EXAMINATION

Initial examination by the ophthalmologist includes comprehensive examination of the dilated eye and discussion of the potential ocular changes of diabetes, specifically retinal. Fundus photography and angiography are suggested only in the presence of clinically detectable diabetic retinopathy and not as routine baseline studies.

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Janet Silverstein, MD

CONSULTANTS

Silva Arslanian, MD
Dorothy Becker, MD
Alan Drash, MD
John Malone, MD
Georgeanna Klingensmith, MD
Lynne Levitsky, MD
Stuart Brink, MD

REFERENCES

1. American Diabetes Association. Screening for diabetic retinopathy. *Diabetes Care*. 1997;20(suppl):S28–S30
2. Frank RN. Etiologic mechanisms in diabetic retinopathy. In: Ryan SJ, ed. *Retina*. St Louis, MO: CV Mosby Co; 1989;II:301–326
3. Bresnick GH. Background diabetic retinopathy. In: Ryan SJ, ed. *Retina*. St Louis, MO: CV Mosby Co; 1989;II:327–366
4. Davis MD. Proliferative diabetic retinopathy. In: Ryan SJ, ed. *Retina*. St Louis, MO: CV Mosby Co; 1989;II:367–402
5. Benson WE, Brown GC, Tasman W. *Diabetes and Its Ocular Complications*. Philadelphia, PA: WB Saunders Co; 1988
6. Diabetic Retinopathy Study Research Group. Photocoagulation treatment of proliferative diabetic retinopathy: the second report of Diabetic Retinopathy Study findings. *Ophthalmology*. 1978;85:82–106
7. Early Treatment Diabetic Retinopathy Study Research Group. Case reports to accompany Early Treatment Diabetic Retinopathy Study reports 3 and 4. *Int Ophthalmol Clin*. 1987;27:273–333
8. Charles S. Principles and techniques of vitreous surgery. In: Ryan SJ, ed. *Retina*. St Louis, MO: CV Mosby Co; 1989;III:191–223
9. Diabetes Control and Complications Research Group. The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin dependent diabetes mellitus. *N Engl J Med*. 1993;329:977–986
10. Diabetes Control and Complications Research Group. Effect of intensive diabetes treatment on the development and progression of long-term complications in adolescents with insulin-dependent diabetes mellitus. *J Pediatr*. 1994;125:177–188
11. American College of Physicians, American Diabetes Association, and Academy of Ophthalmology. Screening guidelines for diabetic retinopathy. *Ann Intern Med*. 1992;116:683–685
12. Witkin SR, Klein R. Ophthalmologic care for persons with diabetes. *JAMA*. 1984;251:2534–2537
13. Peters AL, Legorreta AP, Ossorio RC, Davidson MB. Quality of outpatient care provided to diabetic patients. *Diabetes Care*. 1996;19:601–606
14. Holl RW, Lang G, Heinze E, Lang GK, Teller WM. Both prepubertal and pubertal duration of diabetes affect the incidence of diabetic retinopathy. *Horm Metab Res*. 1997;48(suppl 2):7
15. Donaghue KC, Fung ATW, Hing S, et al. The effect of prepubertal diabetes duration on diabetic microvascular complications in early and late adolescence. *Diabetes Care*. 1997;20:77–80
16. The Kroc Collaborative Study Group. Diabetic retinopathy after 2 years of intensified insulin treatment. *JAMA*. 1988;260:37–41
17. Daneman D, Drash AL, Lobes LA, Becker DJ, Baker LM, Travis LB. Progressive retinopathy with improved control in diabetic dwarfism (Mauriac's syndrome). *Diabetes Care*. 1981;4:360–365

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