

Retinal Hemorrhages: Advances in Understanding

Alex V. Levin, MD, MHSc

KEYWORDS

- Retinal hemorrhage • Child abuse • Shaken baby syndrome
- Abusive head trauma • Retinoschisis

Retinal hemorrhages are a cardinal manifestation of abusive head trauma characterized by repetitive acceleration-deceleration forces with or without blunt head impact (shaken baby syndrome). Approximately 85% of affected children have retinal hemorrhage, with just under two thirds having extensive, too numerous to count multilayered hemorrhages extending out to the edges of the retina (ora serrata) (**Fig. 1**).^{1,2} Because there is a correlation between the severity of brain and eye injury,¹ the prevalence of retinal hemorrhage will be lower in children who survive neurologically intact and higher in those who die from their injuries.³ Prevalence numbers are also affected by the inclusion of patients who sustain single acceleration-deceleration abusive impact head injury, because retinal hemorrhages are distinctly less common in this setting. Although nonophthalmologists are fairly good at indicating the presence or absence of retinal hemorrhage,^{2,4} studies that rely on examinations by nonophthalmologists must be analyzed cautiously.⁵ Proper diagnosis of the ocular signs of abusive head injury requires pharmacologic dilation of the pupils and retinal examination by an ophthalmologist familiar with this disorder.

Much has been learned about retinal hemorrhages since this syndrome was first described by Guthkelch⁶ in 1971. Hundreds of articles from around the world have helped increased understanding of the importance of retinal hemorrhage as a diagnostic indicator of abuse, particularly when the hemorrhages are extensive. This article is devoted to a discussion of the advances in knowledge regarding the documentation, mechanisms, animal models, and outcomes of retinal hemorrhage.

DOCUMENTATION

Two major advancements have occurred in the ability to document the presence of retinal hemorrhage: (1) recognition of the need to detail the retinal findings and (2) retinal photography. The former speaks not only to documentation issues but also

Pediatric Ophthalmology and Ocular Genetics, Wills Eye Institute, 840 Walnut Street, 12th Floor, Philadelphia, PA 19107-5109, USA

E-mail address: alevin@willseye.org

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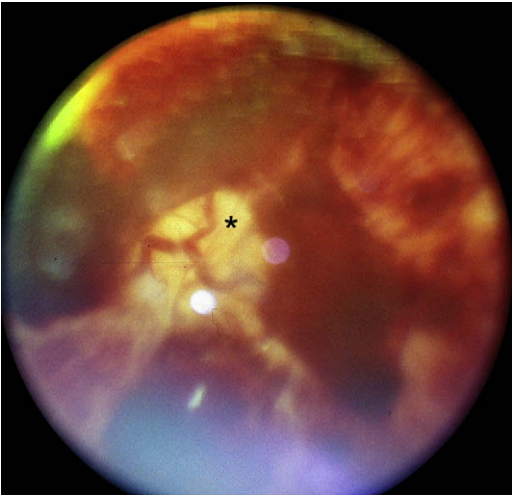


Fig. 1. Severe hemorrhagic retinopathy with too numerous to count retinal hemorrhages surrounding the optic nerve (*). Virtually no normal retina is visible due to the severity of the hemorrhages. In this patient the hemorrhages covered the entire retina extending out to the retinal periphery.

to differential diagnosis. A long list of systemic and ocular disorders (**Box 1**) is known to be associated with retinal hemorrhage. A nonspecific mild hemorrhagic retinopathy or a pattern specific for another diagnosis (eg, retinal infection) is usually present. In the case of the nonspecific retinal pattern, one may not be able to rule out or in abuse.

Box 1
Causes of infant retinal hemorrhage other than child abuse
Hypertension
Bleeding problems/leukemia
Meningitis/sepsis/endocarditis
Vasculitis
Cerebral aneurysm
Retinal diseases (eg, infection, hemangioma)
Carbon monoxide poisoning
Anemia
Hypoxia/hypotension
Papilledema/increased intracranial pressure
Glutaric aciduria
Osteogenesis imperfecta
Examinations in premature infants with retinopathy of prematurity
Extracorporeal membrane oxygenation
Hypo- or hypernatremia
Incomplete list. Diagnosis is usually easily made by history or systemic evaluation. Hemorrhages associated with these conditions are usually few in number and confined to the posterior pole; subretinal hemorrhage is extremely rare. Retinoschisis is not reported.

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