Isolated Subconjunctival Hemorrhages in Nonaccidental Trauma

Stephen G. Spitzer, MD, Joseph Luorno, MD, and Léon-Paul Noël, MD

Purpose: To establish child abuse as part of the differential diagnosis of isolated bilateral subconjunctival hemorrhages in infants. ***Methods:*** To review three cases of nonaccident trauma initially presenting with isolated bilateral subconjunctival hemorrhages as the only significant clinical finding. ***Results:*** Ophthalmic examination in cases 1 and 2 were entirely normal except for the large bilateral subconjunctival hemorrhages. Hematological parameters were normal in all three infants. Initial radiological findings were normal in case 1 but multiple healing rib fractures were identified when the chest X-ray was repeated 3 weeks later. Case 2 had skin and skeletal X-ray findings compatible with abuse at time of presentation to the ophthalmologist. Case 3 was admitted to hospital for multiple unexplained limb fractures but had been seen 2 weeks prior for poorly explained bilateral isolated subconjunctival hemorrhages and facial petechiae. ***Conclusion:*** Nonaccidental trauma should be considered in the differential diagnosis of bilateral isolated subconjunctival hemorrhages in infants especially if associated with facial petechiae. These isolated subconjunctival hemorrhages may be part of the traumatic asphyxia syndrome caused by severe, prolonged compression of the child's chest and upper abdomen. Appropriate assessment includes a complete ophthalmic and pediatric examination as well as hematological testing and imaging studies. If the coagulation profile and initial imaging studies are normal yet there remains a high suspicion of abuse, an immediate nuclear scan or a repeat skeletal survey or chest film 2 weeks later is indicated. (J AAPOS 2005;9: 53-56)

The list of etiologies of spontaneous bilateral subconjunctival hemorrhages in infants and young children is not extensive. This includes vascular anomalies, valsalva maneuver, hematological dyscrasias, malignancies, infections, both systemic and ocular, as well as known and occult trauma (Table 1).[1-4]

Nonaccidental trauma producing bilateral subconjunctival hemorrhages is usually associated with other ocular signs such as lid, skin, or retinal findings.[5-7] These associated findings assist in confirming the traumatic cause of the subconjunctival hemorrhages. We wish to present three infants in whom bilateral subconjunctival hemorrhages were the only ocular findings of nonaccidental trauma and review the associated physical findings and ancillary investigations that helped to confirm the diagnosis.

From the Department of Ophthalmology, Upstate Medical University, Syracuse, New York.
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Reprint requests: Léon-Paul Noël, MD, Clinical Professor of Ophthalmology, SUNY Upstate Medical University at Syracuse, 550 Harrison Street, Suite 340, Syracuse, New York 13201.

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CASE REPORTS

Case 1

This 5-week-old girl was brought to the pediatrician with a 1-day history of progressively enlarging bilateral subconjunctival hemorrhages. Trauma was denied but regurgitation after burping was reported. There was no history of ocular discharge, cough, or upper respiratory tract infection. The infant was the product of a 39-week gestation with a birth weight of 2500 g. The perinatal history was unremarkable but the pregnancy was complicated by the frequent use of marijuana and hashish, although alcohol and street drugs were denied. The mother, known by the pediatrician since her teens, had a history of poor impulse control. Her only other child, age 10 years, was in the custody of Child Protective Services.

When seen the next day by a pediatric ophthalmologist, the infant's visual acuity was central, steady, and well maintained in each eye. The eyes were straight and the extraocular movements normal. The pupils were equal and reacting to light and there were no lid or periocular skin changes. Two large subconjunctival hemorrhages were noted nasally and inferiorly in each eye. The anterior chamber, iris, lens, and dilated fundus examination were all normal. The cycloplegic refraction was +4.00 spherical diopters bilaterally. Two small facial petechiae were noted on the right cheek, as well as one small abdominal periumbilical ecchymosis.

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TABLE 1. Differential diagnosis of isolated spontaneous bilateral subconjunctival hemorrhages in infants and young children

Blood dyscrasia[1]
Hemophilia
Coagulopathies
Thrombocytopenia
Malignancies[2]
Leukemia
Rhabdomyosarcoma
Metastatic neuroblastoma
Infection
Ocular[1]—conjunctivitis
Systemic—pertussis[2], Kawasaki's syndrome[1]
Vascular
Hereditary hemorrhagic telengiectasis[3]
Traumatic
Delivery—vaginal or cesarean[4]
Accidental
Nonaccidental (abuse)

Because of the unexplained etiology of the subconjunctival hemorrhages and the history of a difficult social situation, the baby was hospitalized for medical and protective services investigations.

Hematology assessment including hemoglobin, hematocrit, prothrombin time (PT), partial prothrombin time (PTT), and bleeding time (BT) were all normal. The platelet count was slightly elevated at 474,000 (normal range 150 to 450,000). Bone scan, computerized tomography (CT) of head, and chest X-ray were unremarkable. Delayed planar images of the entire skeleton were also normal. The child was discharged from the hospital to the mother's care and no cause was identified to explain the isolated bilateral subconjunctival hemorrhages.

Three weeks later, the infant was seen in the same pediatric emergency room for an unrelated trauma. Repeat chest X-ray at this time revealed expansion of the posterior aspect of the right 6th, 7th, and 8th ribs consistent with healing fractures. Further skeletal X-rays revealed healing fractures on the anterior aspect of the left 7th rib and a suspicious similar fracture on the left 6th rib. The left 8th rib, as well as the previously noted expansion of the costochondral junctions of right 5th, 6th, and 7th ribs, raised the strong possibility of healing fractures at these sites. Protective Services were again involved and severe chest compression rather than severe shaking by the mother's boyfriend was suspected but never legally proven.

Case 2

A 5-month-old African-American boy who was the product of a full-term pregnancy and an uncomplicated vaginal delivery was referred to pediatric ophthalmology from a general pediatric clinic with a 5-day history of bilateral red eyes. The mother reported the redness of the right eye developed 1 day prior to that on the left. There was no history of discharge, trauma, cough, vomiting, or upper respiratory tract infection.

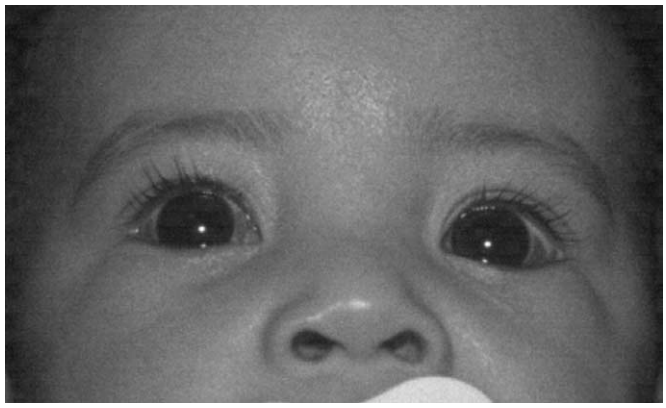

FIG 1. Case 2: Bilateral subconjunctival hemorrhages at time of presentation. No other ocular or facial findings were noted.

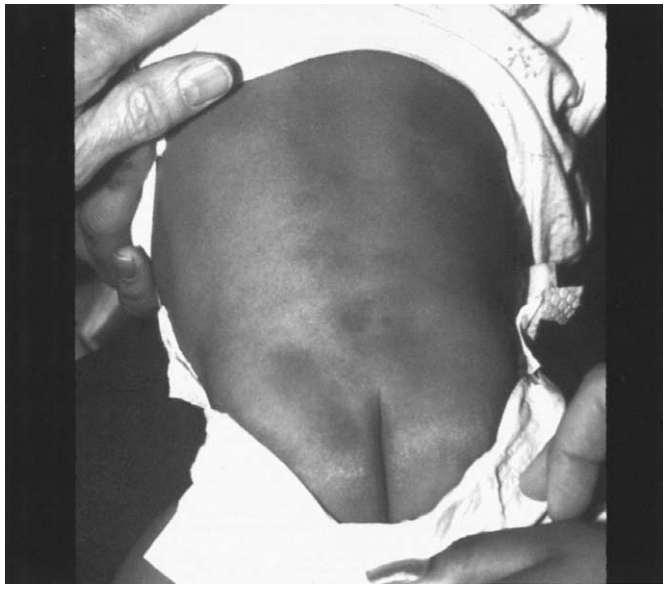

FIG 2. Case 2: Bruises on back compatible with hand outline just above the congenital mongolian spot.

On examination, the visual acuity was central, steady, and well maintained in each eye. The eyes were straight; the extraocular movements were normal, and the pupils were equal and reacting to light. Large bilateral subconjunctival hemorrhages involving most of the inferior half of the conjunctiva were noted (Figure 1). The lids, face, anterior slit lamp examination, and dilated fundus examination were all normal. After undressing the child, bruises in the shape of a handprint were noted on the back, slightly superior to a congenital mongolian spot (Figure 2). The child was referred to Protective Services and admitted to the hospital.

Hematology work-up including PT, PTT, BT, platelets, and sickle cell status were all normal. A skeletal survey revealed eight separate rib fractures in different stages of healing. When reassessed 2 weeks later, the foster parents

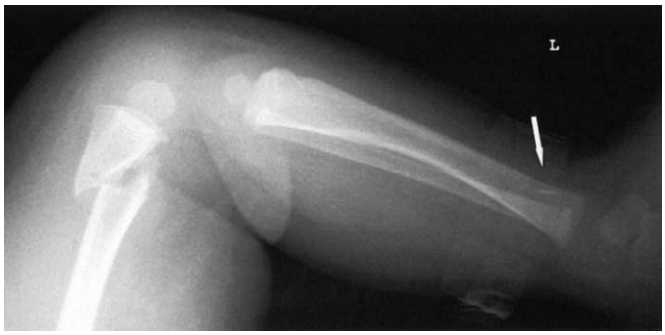

FIG 3. Case 3: Prominent distal femur fracture and subtle distal tibial metaphyseal incomplete buckle fracture (arrow). Dating the age of the two fractures was not possible.

noted no ocular abnormalities and the hemorrhages of the conjunctiva had resolved without sequelae. Charges of child abuse were brought against the parents.

Case 3

This 5-month-old Hispanic girl was brought to the pediatric emergency room because of a swollen left knee. Trauma was denied but X-ray revealed a left distal femur fracture and a distal tibial metaphyseal incomplete buckle fracture (Figure 3). The age of the fractures could not be determined. A skeletal survey was otherwise normal but physical examination revealed bruises on the buttocks and the child was admitted to the hospital for assessment of probable abuse.

Two weeks prior to presentation, the infant was seen at a community health center for "blood in her eyes." The mother also described several small perioral petechiae in association with the ocular changes. The diagnosis was bilateral subconjunctival hemorrhages possibly secondary to coughing in the setting of flu-like illness and the infant was sent home on oral antibiotics.

On admission to hospital for the limb fractures, ophthalmic examination revealed central, steady, and well-maintained vision in each eye. The eyes were straight; the extraocular movements were normal, and the pupils were equal and reacting to light. A resolving subconjunctival hemorrhage was noted temporally in the left eye and according to the mother the right hemorrhage had completely resolved. The anterior slit lamp and posterior fundus examinations were normal. Hematologic studies including PT and PTT were normal except for a slightly elevated platelet count of 479,000 (normal range 150 to 450,000). The child was discharged to foster care.

DISCUSSION

These three cases of subconjunctival hemorrhages as the only ocular finding of child abuse are very informative from several aspects. Ophthalmic reports have documented that all ocular structures may be implicated in cases of child abuse.[5,8] In particular, retinal findings in conjunction with neuroimaging frequently confirm the nonaccidental nature of a child's neurological and systemic injuries.[5-8]

Isolated subconjunctival hemorrhages with no associated lid bruising, corneal, anterior chamber, or retinal findings have not been described as associated with child abuse. Once the limited differential of isolated bilateral subconjunctival hemorrhages has been investigated (Table 1), nonaccidental trauma must be seriously considered. Prompt and appropriate physical examination by pediatrics, as well as radiological investigations for neurological and skeletal signs of abuse, must be ordered.

The subconjunctival hemorrhages documented in these three infants are probably part of the traumatic asphyxia syndrome. This syndrome is closely related to Purtscher's syndrome and chest trauma may produce either entity. In Purtscher's syndrome, trauma to the chest is associated with cotton wool spots and occasional retinal hemorrhages. The pathogenesis of the retinal findings is incompletely understood. There are no systemic findings in Purtscher's syndrome, whereas in the Traumatic Asphyxia Syndrome, the external findings can be striking.[9] This clinical syndrome first described by Ollivier[10] in 1837 is characterized by cervical facial cyanosis, multiple ecchymotic hemorrhages of the face, neck, and upper chest, and subconjunctival hemorrhages.[11-13] In its full classical form, the traumatic asphyxia syndrome is caused by severe prolonged compression of the thorax and upper parts of the abdomen. The compressive force is transmitted to the mediastinum and blood is forced out of the right atrium through the valveless innominate and jugular veins into the head and neck. This sudden increased pressure in small venules and capillaries causes rapid dilation and minute hemorrhages producing the often seen facial petechiae. Conjunctival vessels are similarly exposed to this sudden increased pressure, resulting in large subconjunctival hemorrhages. The facial petechiae noted in case 1 and described by the mother in case 3 accompanying the bilateral subconjunctival hemorrhages could well be explained by such chest compression. Certainly, the ecchymotic findings in the shape of a handprint noted on the back of case 2 would suggest compression of a child's body as would be done when a child is violently squeezed.

The left distal femur fracture in case 3 was undoubtedly recent but one can speculate that the incomplete metaphyseal buckle fracture may have been present when the child was originally seen, 2 weeks earlier, with the poorly explained bilateral subconjunctival hemorrhages and facial petechiae. Greater physician awareness of bilateral unexplained subconjunctival hemorrhages and facial petechiae as a sign of possible child abuse could have led to a skeletal survey and an earlier diagnosis, thus sparing the infant from a more brutal injury 2 weeks later.

The initial normal skeletal survey in case 1 highlights that, in cases of suspected abuse, especially in a very young child, a nuclear scan may be required to identify a fresh

small fracture which has not as yet had time to produce a tell-tale callous. An alternative solution would be to repeat the chest X-ray or skeletal survey 2 weeks later, at which time callous formation would make even fine fractures more easily identifiable.

In conclusion, child abuse should be added to the differential diagnosis of unexplained isolated large bilateral subconjunctival hemorrhages in an infant, even in the absence of other ocular findings. Careful examination of the face for small petechiae is important. If no satisfactory explanation for the subconjunctival hemorrhages is available especially in young infants who are not yet crawling or cruising, assessment for other skin, skeletal, or radiological signs of nonaccidental trauma is indicated and Child Protective Services must be alerted.

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An Eye on the Arts – The Arts on the Eye

In a recent article in *Nature*, linguists demonstrated that how humans categorize even such a basic biologically determined perception as color affects how like or unalike are the ways we classify different colors.[97] English-speaking peoples routinely distinguish between green and blue, while the Berinmo tribe of hunter-gatherers in Papua New Guinea do not. What English speakers call yellow, Berinmos divide between "wor" and "nol," while English speakers have the same problems classifying their previous uncategorized yellows as "wor" or "nol" that Berinmos have in classifying blues and greens. One investigator concluded that "categories affect the way we perceive the world."

—Steven M. Wise (from *Rattling the Cage: Toward Legal Rights for Animals*)