

Children With Signs of Abuse

When Is It Not Child Abuse?

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Abstract

Child abuse is a problem that is frequently underdiagnosed. Recognition that underdiagnosis of abuse exists has produced a high zeal for identifying cases of child abuse, which has inevitably produced cases of overdiagnosis. Overdiagnosis of child abuse is as catastrophic as underdiagnosis. In this case, a family member is often accused of injuring or killing a child at a time when the loss is felt most deeply. This review focuses on 1 specific presentation of child abuse—the child with bruises and bleeding. Many children and adults have coagulation or vascular disorders that predispose them to bruise or bleed excessively with minor trauma. It is very easy for a health care worker to presume that bruising and bleeding is associated with trauma, because the coagulopathies that may explain the findings are often poorly understood. The clinical cases reviewed in this article show the need for an extremely thorough analysis for an underlying bleeding disorder in the bruised or bleeding child being evaluated as a possible victim of child abuse.

Correctly distinguishing between accidental and nonaccidental injuries in children has critical ramifications. An overview of the literature regarding injuries in children indicates that many underlying diseases often mimic child abuse and that although there are some published guidelines to help clinicians evaluate social conditions that might suggest child abuse,¹ there are not standard published guidelines to evaluate a wide range of clinical conditions that mimic and likely rule out child abuse. Certainty in these cases is a difficult goal; however, overdiagnosis and underdiagnosis of child abuse have devastating effects, not only for the child, but also for the entire family. Understanding the various ways these diagnoses can be reached incorrectly is critical to gaining better outcomes. Following is a review of many cases described in the literature, and 2 others in our case experience not yet published, that were misdiagnosed as child abuse, with information on how the correct diagnoses were missed. Because bruising is among the most common reasons a child may be evaluated for child abuse, a suggested standard evaluation for coagulopathies when a child has bruising and is being evaluated as a potential abuse victim is also presented.

Sadly, many forms of child abuse exist. The National Clearinghouse on Child Abuse and Neglect Information, an office of the US Department of Health and Human Services, categorizes abuse as follows: neglect, physical, sexual, and other (which includes verbal and emotional abuse). This review involves cases of suspected physical abuse and focuses on bleeding and bruising. *Physical abuse* is defined as “inflicting a non-accidental physical injury upon a child. This may include burning, hitting, punching, shaking, kicking, beating, or otherwise harming a child.”² In 1997, a special report from the Federal Interagency Forum on Child and Family Statistics presented statistics indicating that in 1993, 381,700 (or 5.7 per 1,000) children were

abused physically out of approximately 1.6 million children who were abused or neglected.³

We found it impossible to find statistics on the number of child abuse cases that are overdiagnosed or underdiagnosed. Anecdotal evidence appearing in the form of case reports is the only form of information indicating that both types of outcomes occur. The path to correct diagnosis is not easy. The sheer size of the medical knowledge base necessary to rule out other noninflicted possibilities and the nature of the legal system create impediments. In addition, the suspicion aroused by some presenting symptoms, in conjunction with "early evidence of psychosocial problems" in the family, may mislead a clinician into "protecting" the child and making "an erroneous early conclusion which may later adversely affect the physician's ability to intercede for the benefit of the patient and family."⁴

The broad categories of symptoms observed in an emergency department or in a physician's office that might indicate physical abuse include burns, broken bones, and/or bleeding and bruising. Unfortunately for the clinician evaluating these types of symptoms there are many noninflicted causes, ranging from the common to the very uncommon, that must be ruled out.

Several signs and symptoms that can be produced by assault along with selected disorders that can mimic them are shown in **Table 1**. For bone fractures, a review of the literature showed the following disorders can mimic child abuse: osteogenesis imperfecta, metabolic bone disease, congenital insensitivity to pain, metabolic bone disease, multifocal infection, infantile cortical hyperostosis, clavicle injured at birth, scoliosis, osteomyelitis, congenital hydrocephalus, Caffey disease, and osteoporosis.⁵⁻⁷ Impetigo can mimic cigarette burns. Impetigo is common, and cigarette burns are not. Scalding, dermatitis, chilblains, drug eruption, mechanical abrasion, and accidental exposure to commercial grade vinegar are reported in the literature as being mistaken for child abuse.⁵

Bleeding and bruising can be especially complicated to understand when there is suspicion of physical abuse. Certainly it is true that a child with a bleeding disorder also might be abused physically; however, a child with bruising needs to be evaluated carefully so that any question of abuse is considered in the context of a bleeding disorder that might be present. Bleeding disorders are common, affecting more than 1% of the population.⁸ They often are inherited and misunderstood. If a genetic component exists with a mild bleeding disorder, the family is likely to consider excess bleeding (frequent nosebleeds, for example) normal and might not provide this information to a clinician seeking family history. Such information, if understood, could direct the clinician to evaluate the child for such a hemorrhagic disorder.

Table 1
Symptoms That Suggest Child Abuse and Noninflicted Entities That Might Cause Them⁵⁻⁷

| Physical Symptom | Possible Noninflicted Cause |
|------------------|---|
| Bone fractures | Osteogenesis imperfecta Metabolic bone disease Congenital insensitivity to pain Metabolic bone disease Multifocal infection Infantile cortical hyperostosis Clavicle injured at birth Scoliosis Osteomyelitis Congenital hydrocephalus Osteoporosis |
| Burns and scalds | Impetigo Dermatitis Chilblains Fixed drug eruption Mechanical abrasion Accidental exposure to commercial grade vinegar |
| Bruises | von Willebrand disease Hemophilia A and B Protein S and C deficiencies Idiopathic thrombocytopenic purpura Thrombocytopenia with lymphoblastic |
| leukemia | Vitamin K deficiency Purpura fulminans Meningitis with disseminated intravascular coagulation Hemorrhagic disease of the newborn Henoch-Schönlein purpura Ruptured subarachnoid vascular formation Blue spots malformation |

A myriad of coagulopathies exist that can mimic child abuse. Unfortunately, cases are found in the literature involving families that have undergone the severe torment of being mislabeled as child abusers. von Willebrand disease affects approximately 1% to 2% of the population. Hemophilia A and B affect approximately 1 in 10,000 individuals.⁸ Both of these diseases have been mistaken as child abuse. Idiopathic thrombocytopenic purpura, thrombocytopenia with lymphoblastic leukemia, vitamin K deficiency, purpura fulminans, meningitis with disseminated intravascular coagulation (DIC), hemorrhagic disease of the newborn, Henoch-Schönlein purpura, and ruptured subarachnoid vascular malformation also appear in the literature misdiagnosed as child abuse.

Review of Cases of Bleeding and Bruising Masquerading as Child Abuse

Each of the cases that follow were found to not be child abuse because subsequent questioning, after the family was facing prosecution, revealed the true cause of the signs and symptoms.

von Willebrand Disease

A 3-month old was brought to the hospital after 2 days of evaluation, first at the pediatrician's office and then at another hospital, with seizures, bilateral retinal hemorrhages, subdural and subarachnoid hematomas, a history of easy bruising, with no apparent bruising at the time of admission anywhere on the trunk, back, or arms. The father reported that he had dropped the child while feeding her a bottle the night before and caught her and pulled her upward sharply before she struck the floor.

An initial review for coagulopathies was performed. von Willebrand disease, thrombocytopenia, and disorders associated with a prolonged prothrombin time (PT) and prolonged partial thromboplastin time (PTT) were ruled out. The physician interpreting the test results was unaware that the trauma of a fall, such as the one described by the father, could increase a low value for von Willebrand factor and for ristocetin cofactor well into the normal range.

The father was arrested for shaking his child and sent to trial. The mother was charged with neglect for leaving the child with the father, who had no violent or untoward history. The child was put into foster care and suffered continued bruising. At 6 months, the child was admitted to another hospital by the foster parent; the child had meningitis and a subdural hematoma. The bleeding history triggered tests for coagulopathies after the infection subsided. The child was diagnosed with moderately severe von Willebrand disease.

The prosecutor and states' witnesses, with virtually no expertise in coagulation disorders, insisted that the presence of a moderately severe bleeding disorder in the absence of bruises on the trunk, arms, or shoulders did not rule out shaken baby syndrome. The prosecutor argued that the literature was devoid of cases citing misdiagnosis of child abuse with underlying von Willebrand disease in a child with the exact constellation of presenting symptoms found in this child. The prosecutor further argued that retinal hemorrhages are pathognomonic of shaken baby syndrome. Cases of spontaneous bleeding in the head or retina with von Willebrand disease were considered completely irrelevant. The father was convicted and incarcerated. The child has largely recovered. Treating physicians at the hospital where the meningitis and von Willebrand disease were diagnosed thought that the clinicians who diagnosed shaken baby syndrome were overzealous in their pursuit of the abuse diagnosis.

It is worth reviewing the specifics of shaken baby syndrome because it is largely a diagnosis determined by particular presentations of bleeding. Caffey⁹ introduced the whiplash shaken baby syndrome, now referred to as shaken baby syndrome, as a diagnosis in 1972. The disproportionate size of the infant head and weak neck muscles allow for the signs and symptoms of this condition. This syndrome generally refers to a constellation of symptoms that includes

subdural and/or subarachnoid hemorrhage and bilateral retinal hemorrhages.¹⁰

Two issues must be considered when making this diagnosis. First, the bilateral retinal hemorrhages might not be indicative of shaken baby syndrome directly, as previously thought, but might be a result of increased intracranial pressure.¹⁰ Increased intracranial pressure can result from hemorrhage from major trauma to the head but also from other causes. The minor trauma reported by the father in this patient with von Willebrand disease could explain the results. The slow pooling of blood in the subdural hematoma in this case was highly consistent with the presence of von Willebrand disease, which would permit oozing of blood into the subdural hematoma, increased intracranial pressure, and resultant retinal hemorrhages.

Diseases exist in which noninflicted events have generated unilateral and bilateral retinal hemorrhages. These diseases include retinopathy of prematurity, Coats disease, anoxia, cytomegalovirus, herpes simplex, endocarditis,¹¹ X-chromosome-linked juvenile retinoschisis,¹² aplastic anemia,¹³ and von Willebrand disease.¹⁴ It is especially troubling that the concept persists that retinal hemorrhages are pathognomonic of shaken baby syndrome, because with clinicians who believe this to be true, the patient and his or her family have almost no opportunity to pursue the diagnosis of an underlying disease.

A similar case involved a 1 year-old child who reportedly was playing with his 2 older siblings on a bed and fell head first a few feet onto a hardwood floor. The child suffered a subdural hematoma and subsequently developed bilateral retinal hemorrhages. Despite having cared for his children alone, daily, in the evenings while the mother was working for several years, it was determined the father had assaulted the child, and he was accused of attempted murder. The initial evaluation for a bleeding disorder did not include any testing for von Willebrand disease. Evaluation of the child (twice) and his 2 older siblings (once) later revealed a diagnosis of von Willebrand disease in the child and in both siblings. When these test results were obtained, at least 6 months after the event, the charges against the father were dropped. It should be noted that the first evaluation for von Willebrand disease of the child with trauma was performed at a time when the child had rhinorrhea and an elevation of acute phase reactants, one of which is von Willebrand factor. In this evaluation, the child had values that were essentially normal. If it had not been recognized that the von Willebrand factor level was likely to be much lower at baseline, the repeated study that established the diagnosis would not have been done.

Hemophilia

In 2003, a 7-month-old child was brought to the hospital by his single mother. The child was reported to have hit his

head on a wall after a fall from his cradle while under the care of a sitter 2 weeks earlier. On the day before admission, the child became somnolent and had 2 episodes of vomiting. A computed tomography scan showed disjunction of the left lambdoid suture, a left parieto-occipital epidural hematoma, and a suggestion of bifrontal cortical atrophy. The child underwent a left parieto-occipital craniotomy. During surgery, a large epidural hematoma was drained and a left occipital fracture was found. No fractures were found on radiographs of the long bones. A diagnosis of child abuse was registered. Two weeks later, the child was brought back to the hospital for dehiscence of the surgical wound from drainage of a large subgaleal hematoma. While the child was still hospitalized, another subgaleal hematoma formed at the same site. Coagulation testing was performed, hemophilia A was diagnosed, and child abuse was excluded.¹⁵

Wheeler and Hobbs⁵ reported a case of a 3-year-old Asian child who was referred to the hospital for excessive bruising. The child subsequently was diagnosed with hemophilia A.⁵

Schwer et al⁴ described a case of a 10-month-old child with severe bruising over all portions of his body and a healing clavicle fracture. The family had no explanation for the bruising and fracture. Child abuse was suspected until the PTT was found to be abnormal. The child abuse diagnosis was dropped when hemophilia was diagnosed.⁴

Idiopathic Thrombocytopenic Purpura

in 1997, Harley¹⁶ reported a case of a 2-year-old with a 2-day history of unexplained bruising. A teacher reported the child's bruises to the police, and the child was taken by the police to an emergency department where no tests were done. The child was put into protective custody. The following day, the child was seen by another physician who observed petechiae scattered all over the body and multiple bruises ranging up to 6 cm. A CBC count was ordered. Idiopathic thrombocytopenic purpura was diagnosed, and the child was sent home after being stabilized at the hospital.

Late Hemorrhagic Disease of the Newborn

A 10-week-old child was brought to the emergency department, comatose and hypotensive, with a bulging fontanelle, large bruises over her buttocks and thighs, bilateral multiple hemorrhages, severe cerebral edema, subdural and subarachnoid bleeding, and an extensive gluteal intramuscular hematoma; brainstem reflexes were absent. She also had an elevated PT and a low factor VII level. She was diagnosed with nonaccidental injury. The coagulopathy initially involving the low factor VII level was attributed to the severe head injury because such an injury can produce DIC that lowers the factor VII level. The initial conclusion was that the child was physically assaulted. However, as further medical history was

obtained, it was realized the child had never received vitamin K prophylaxis as a newborn, which also can result in a low factor VII level. Autopsy confirmed late hemorrhagic disease of the newborn.¹⁷

Vitamin K Deficiency

A 4-month-old brought to the emergency department was pale, emaciated, and irritable with severe developmental delay, recurrent episodes of vomiting and diarrhea associated with frequent changes of formula, and multiple bruises. Laboratory analysis showed DIC with sepsis and vitamin K deficiency. The child received vitamin K, and the DIC resolved as the sepsis was treated effectively. A casein hydrolysate-sucrose formula was introduced, and the child's general condition improved markedly. The parents were perceived to be poorly educated, in poverty, inexperienced as parents, with family environmental isolation. Child neglect was diagnosed. By chance, a salty taste from the child's skin was noted. A diagnosis of cystic fibrosis with vitamin K deficiency secondary to the pancreatic and gastrointestinal disturbances of cystic fibrosis was made, and the child neglect diagnosis was abandoned.¹⁸

Thrombocytopenia With Lymphoblastic Leukemia

A 2-year-old child was found unresponsive by her mother, who with her boyfriend, rushed the child to the hospital where she died. The child had numerous bruises of various ages on her back and extremities, and the police were notified. Petechiae were present on her face, chest, abdomen, and labia majora. Focal hemorrhages existed on the anal mucosa. A previous police report existed from an anonymous caller noting the child had been seen at a restaurant with numerous bruises. It was thought that the boyfriend was responsible for the significant bruising. Autopsy revealed that the child had undiagnosed, untreated lymphoblastic leukemia, and the bruising and hemorrhages were explained by the low platelet count associated with her leukemia.¹⁹

Henoch-Schönlein Purpura

A case report appeared in 1998 by Daly and Stegel²⁰ of a 3-year-old brought to an emergency department with multiple bruises on the buttocks and lower extremities. The child lived with her mother, sibling, and mother's boyfriend. The mother had a history of substance abuse. The sibling had cerebral palsy and severe developmental delay, allegedly from shaken baby syndrome. With the exception of a 2-day history of nausea and vomiting the week before, the medical history of the child was unremarkable. Swelling and tenderness were apparent over the left eye and on the right knee. The patient was believed to have nonaccidental injuries, and child protective services was contacted. The child was put into the care of a relative. During the next 2 days, more

ecchymoses appeared, and this time some of the purpuric lesions were palpable. Henoch-Schönlein purpura was diagnosed. The child was returned to the mother, and more lesions continued to appear. The child was returned to the hospital for further evaluation, and Henoch-Schönlein purpura was diagnosed again. The author of the case report was impressed by the hospital's persistent efforts to prove child abuse on the second visit, despite a clear diagnosis that explained the bruising.²⁰

Ruptured Vascular Malformation

In some cases, the cause of bleeding is not related to anything in the flowing blood, but instead to a blood vessel that has ruptured. An example of noninflicted injury masquerading as shaken baby syndrome appeared in a 1995 report by Weissgold et al.²¹ This case involved a child with an acute intracranial hemorrhage and diffuse cerebral edema, coupled with optic nerve sheath hemorrhages. The parents were perceived to be remarkably stoic throughout the admission and death of the child, and because of this, the pediatrician became suspicious that they had abused their child. When the child died, prosecutors were anxious to charge the parents criminally for shaken baby syndrome but waited for the completion of an autopsy. The autopsy demonstrated an unusual vascular malformation that had ruptured.²¹

Legal System

If the clinician has been unable to rule out noninflicted sources of injury to a child with the expertise available at the time, "the dye becomes set and all the processes connected with the state system through which children are protected follows."²² It is crucial, therefore, that the process of evaluation be as complete as possible and include a requirement to rule out other entities, which might not be within the expertise of the evaluating physician or local experts, that can mimic child abuse.

At the point the case is reported, the legal and medical systems merge in an effort to sort out the evidence as fairly as possible, with maximal "protection" given to the child. Unfortunately, the 2 systems were not designed to work together all that well. Many issues related to jurisprudence inhibit the sharing of information, while the medical community optimizes clinical outcome by information sharing. The problem becomes apparent in the evaluation of child abuse when the treating physician is unable to discuss the case with experts brought by the defense who indeed might have specialized knowledge not available to the physician making the diagnosis of child abuse.

Because several clinical entities that can mimic child abuse are uncommon and many more are rare, the likelihood

that a primary care physician or a local specialist could miss one of these diagnoses is not small. Worse still, the practices in the courtroom to challenge the testimony of the opposing witness in an effort more to win the case than to reveal the true circumstances make many expert physicians, who would provide the best insights, unwilling to step forward. Juries for any case are not composed of medical experts, and their ability to determine the credibility of one physician over another often depends highly on the skills of particular attorneys involved. In addition, the expert testimony the defendant can obtain often is very dependent on his or her financial resources. A defendant of little means may be unable to bring forward a convincing and credible expert, let alone multiple experts, to testify on his or her behalf. Therefore, the ability to sort out medical evidence in a courtroom, while certainly possible, has serious limitations.

Conclusion

Coagulopathies can mimic child abuse not only by producing easy bruising, but also by allowing small bleeding episodes to become large ones, suggesting to a treating physician that massive force was applied to create the bleeding. Although children with bleeding disorders indeed might be abused, many articles describing cases of child abuse never mention that coagulopathies were ruled out, and in many other reports, the evaluation for coagulopathies is superficial, leaving much room for an undiagnosed bleeding disorder. Even if abuse might have occurred and been documented by other clinical signs, in the presence of a coagulopathy, it might well be that the force applied to the child was not as excessive as the hemorrhaging would seem to indicate. Antiplatelet and anticoagulant medications also can exacerbate bleeding in a patient with a mild or an undiagnosed bleeding disorder. For example, the use of aspirin in patients with mild von Willebrand disease can result in significant bleeding.

Given the inherent challenge of differentiating child abuse from other noninflicted injury, hospitals should consider establishing guidelines for appropriate evaluation of suspected cases of bruising and bleeding in children, including consideration of noncriminal causes. Careful and structured testing for disorders that can cause bleeding and bruising should be established. In addition, a careful medication history to identify drugs that impair hemostasis, including aspirin and nonsteroidal anti-inflammatory drugs, is essential in the evaluation of a bruised child.

A suggested list of tests to be considered at the time of admission would include PT, PTT, platelet count, fibrinogen, von Willebrand factor, ristocetin cofactor, platelet aggregation studies by one of several available methods, and assays

for factors II, V, VII, VIII, IX, X, and XI to identify mild factor deficiencies that do not prolong the PT or the PTT but might predispose to bleeding. In all of the cases described in this review, one or more of the aforementioned tests at one time or another in the course of the patient's illness revealed the underlying diagnosis. Other tests for more rare bleeding disorders also could be considered if the circumstances merit further evaluation. In the case of factors that are acute phase reactants, the information should be very clear to the treating physician, so a test for these factors is delayed or reordered to obtain the correct answer.

Finally, another important reason that such tests must be performed on admission of the child with bruising or bleeding is that the child might die, and at this point, the cause of the bruising can rarely, if ever, be established. Although many in the court system might believe that the most definitive way to determine cause of death is autopsy, for coagulopathies, which require circulating, unclotted plasma from a living patient for diagnosis, this statement is not correct. Without a substantial evaluation for coagulopathies while the patient is alive, the worst-case scenario is that the family cannot get the truth and might be forced to live with the incorrect perception of guilt and possible punishment, in addition to the death of their child.

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