

The Bruised Premobile Infant

Should You Evaluate Further?

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Abstract: Three premobile infants with unexplained bruising are described. Although, they were asymptomatic otherwise, evaluation led to the recognition of inflicted rib fractures in two and hemophilia A in one. Although such bruises are inconsequential themselves, they may provide the opportunity to recognize serious problems before major injury or morbidity occurs.

Key Words: child abuse, bruising, infants, coagulation disorders, hemophilia

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Physicians occasionally are faced with an infant that is not yet independently mobile, but has unexplained bruises. Although infants, who are not yet cruisers, rarely have bruises,^{1–3} there are no prospective studies to suggest how often these bruised infants have clinically occult but serious problems. Bruises are extremely common in abused children^{3,4} and ignored or inadequately “explained” bruising is common in children with a missed diagnosis of inflicted head injuries.⁵ Congenital and acquired disorders of coagulation can also initially present as unexplained bruising.^{6–9} The following case reports are presented to emphasize the serious clinically occult problems that can be found in premobile infants with isolated unexplained bruising.

CASE

Case 1

A 4 ½-month-old boy was brought to the emergency department (ED) by his mother for bruising. Two weeks before he was taken to visit his father in another state. When his mother first saw him thereafter, 5 days before the ED visit, she observed bruises of his left arm and left chest. Because she did not suspect trauma, and he was acting normally, she called his primary care physician who recommended waiting till her return home before seeking care. Over the next 2 days, she noted additional bruises on his chest and left abdomen. She and the child’s father had been his only caretakers. Mother noted that dad had “big strong hands and may have accidentally bruised him while picking him up.”

Bruise colors in the ED were purple/black with some yellowing. The bruises of his chest tracked along the ribs and had associated swelling and induration (Fig. 1). Several dusky left lower quadrant bruises were present.

Anticipating fractures under the indurated bruises over the ribs, a skeletal survey was done, but was normal. Subsequently,

his initial platelet count at 463,000/μL (nl. 300–750,000), hematocrit 38.6% (nl. 29.0–41.0), prothrombin time (PT) 11.2 seconds (nl. 9.55–14.0), international normalized ratio 0.9, and thrombin time (TT) 17 sec. (nl. 17–22) were all normal, but his activated partial thromboplastin time (aPTT) was 127 sec. (nl. 25–39) and his Factor 8 level was < 1% (nl. 50–150). His factors IX, XI, and XII levels and von Willebrand factor activity also were normal.

He had been the product of mother’s first pregnancy, an uncomplicated term vaginal delivery. His subsequent health and growth had been normal. In retrospect, mother recognized that he had prolonged bleeding after his newborn heel-stick metabolic screen. However, his circumcision had been uncomplicated, and his 2-month immunizations did not result in bruising or excess swelling. Family history was negative except for lifelong nosebleeds, requiring cautery, in his mother.

Case 2

A 2-month-old boy was brought for routine well child care. He had been born with appropriate gestational age growth at 36 weeks; his mother had been on bed rest for premature contractions for the last 2 months of her otherwise uncomplicated second pregnancy. However, he was hospitalized for his first month of life primarily for feeding and temperature control issues. He initially had been jaundiced to 14.2 mg/dL (nl. 6.6–10.5) and was mildly anemic at 27% at discharge. He had been doing well except for spitting and fussiness when seen 1 week after discharge. His jaundice was resolved.

At the 2-month visit, his fussiness and irritability were worse, and he was keeping his parents up at night. Mother’s older sister was lactose intolerant, and mother’s relatives had been diagnosed with irritable bowel syndrome. His growth and examination were entirely normal, until, when turned prone to check his spine 3 faint lines of petechial bruises were observed tracking along his right posterior ribs. After that, mother reported that he previously had had a wrist bruise. A trial of nonlactose formula was recommended, and he was referred for coagulation studies and a chest film. However, he did not arrive for them till a week later, after repeated telephone prodding of his parents by his pediatrician.

His chest film demonstrated soft callus of his right lateral eighth rib. About 1 to 2 cm off the spine his right tenth to eleventh and left eleventh ribs were more developed callus and the lateral arcs of his left fifth to sixth ribs had soft tissue density separating the inside of his ribs from his lung (Fig. 2). Concern was raised for possible additional bilateral rib neck fractures. His earlier bruising had disappeared, but a small bruise now was seen on the tip of his left knee and a faint linear bruise crossed his proximal left calf. His complete blood cell (CBC) count, PT, aPTT, blood urea nitrogen, creatinine level, calcium, phosphate, and alkaline phosphatase were all normal. His cranial computed tomography scan and subsequent magnetic resonance imaging were normal except for areas of prematurity related incomplete frontal white matter myelination. His retinal examination was also normal.

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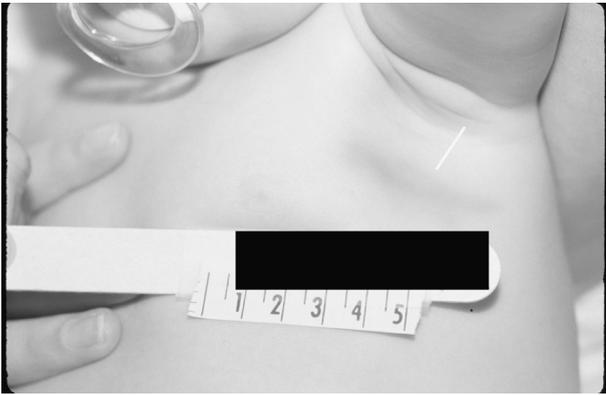


FIGURE 1. Four-month-old boy with bruising and induration along left ribs due to hemophilia A.

His father had a history of physical and emotional abuse as a child. There was no parental substance abuse or domestic violence history. His mother was full time at home, while father worked 9 to 10 hours a day. Dad participated in his care at night.

He was discharged to the care of his maternal grandparents. Police investigation did not identify his assailant. A follow-up skeletal survey a week later demonstrated progression of callus of the recognized rib fractures, early callus of the left sixth to seventh ribs laterally, and cortical irregularities of the right proximal and left distal femurs, suggestive of metaphyseal chip fractures.

His 2-year-old brother had a normal history, physical examination, and skeletal survey.

Case 3

A 6 ½-month-old boy was referred by his primary care nurse practitioner for laboratory evaluation and a skeletal survey

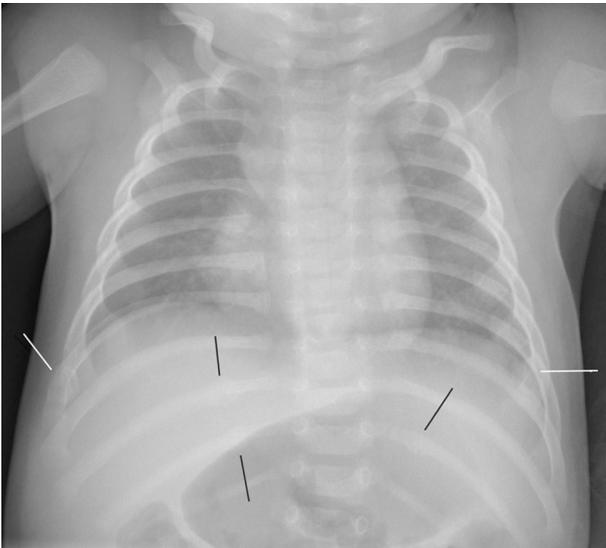


FIGURE 2. Two-month-old boy who had bruising along his right posterior ribs 1 week before. Soft callus of the right lateral eighth rib (left white line) and hard callus of the right tenth to eleventh and left eleventh posterior ribs (black lines) were present. The left sixth to seventh ribs had soft tissue density between the underside of ribs and the lung (right white line).

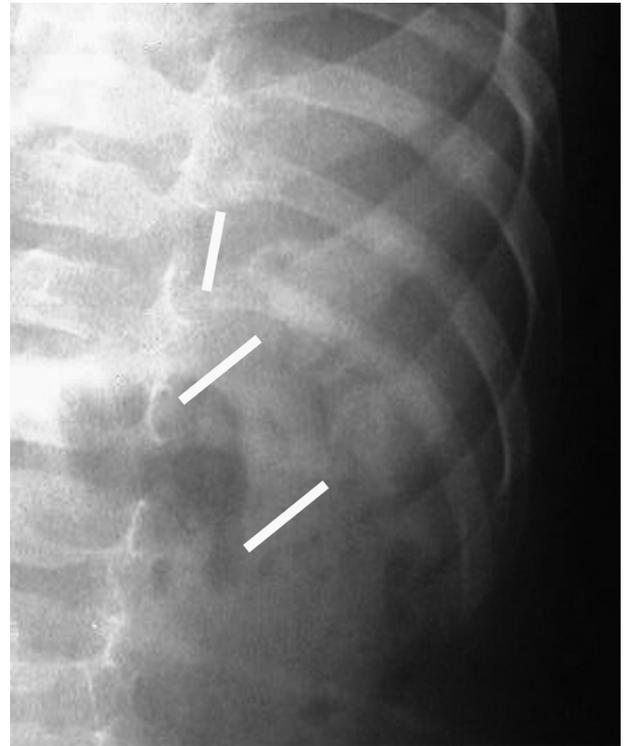


FIGURE 3. Six-month-old boy with abdominal bruising; oblique view of the left ribs; healing sixth to eight chostochonrdal fractures are noted (white lines).

because of abdominal bruising noted during his well child examination.

Three weeks before, the infant's male nanny had carried him about 3 miles in a backpack. Thereafter, his mother noted he had a rosy, possibly bruised perineum. On another occasion his mother had heard him crying downstairs. He was being spooned with baby food by the nanny and had a red swollen eyelid. Once while having "tummy time" with his nanny, while he had a pacifier in his mouth, he sustained upper lip bruising.

He was a spitty baby, diagnosed with gastroesophageal reflux and treated with ranitidine and a wedge. His mother had cared for him full time until 4 months of age before she returned for work. He had been solely breast fed and subsequently refused the bottle. His nanny had previously cared for his 2-year-old sister without problems.

His CBC count and coagulation studies were normal. His chest film revealed callusing fractures of his right sixth to seventh and left sixth to eight chostochonrdal junctions (Fig. 3). His skeletal survey was otherwise normal. The backpack was brought in and appeared unlikely to cause focal perineal force. Referral for police investigation was made, and he was discharged to his parent's care.

DISCUSSION

These 3 premobile infants were observed to have bruises, unaccompanied by other signs or symptoms suggesting serious disease. Evaluations, conducted strictly because of unexplained bruises, had been observed, resulted in the diagnosis of 1 with hemophilia A and 2 as child abuse victims. Unfortunately,

because they were not part of a prospective study, I am unable to say how many other children evaluated had normal or abnormal studies. However, the serious implications of the diagnoses of these infants suggest that full evaluation is warranted.

Although common in later childhood, bruises are much more unusual in premobile infants. A bruise was observed in only 0.6% of normal infants coming for well child care at younger than 6 months¹ and 1.2% to 1.7% of children younger than 9 months had a single bruise.^{1,2} Bruises did not become more common until the infants started to cruise.¹ Among unintentionally bruised children, injuries occur predominately in areas where skin closely overlies bony prominences and in areas that the child leads with in activity.¹ For older, mobile infants and toddlers, most bruises occur over the knees, shins, and brow.¹ Softer, padded body areas tend to be spared from injury.^{1,10} Further, extensive or patterned bruises are highly suggestive of abuse.¹⁰ Infants younger than 6 months usually do not develop sufficient kinetic energy on their own to bruise. One exception would be accidental falls from elevated surfaces. Some bruised infants will have very plausible and/or corroborated unintentional causes of their bruising, so they may not require extensive evaluations.

Bruising and particularly bruising in unusual locations such as the face or buttocks is common in abused children and children with inflicted head injuries. McMahon et al⁴ found 97% of abused infants to have bruises, of which 49% were on the head and face. In a study of missed diagnoses of inflicted head injury, Jenny et al⁵ found that 37% of these children had physician observed facial or scalp injuries at the time of the visit at which the diagnosis was missed. Because their diagnosis was missed, 27.8% were reinjured, 9.1% died, and 40.7% sustained serious additional morbidity.

Only one of the current 2 abused infants had cranial imaging. However, in a retrospective study, children younger than 6 months with physical abuse were reported to have clinically occult cranial or intracranial injury 29% of the time.¹¹ In addition, in a retrospective review of child abuse consultations in children younger than 2 years with one of the following: multiple fractures, rib fractures, facial injury or age younger than 6 months, but no clinically evident skull or intracranial injury, 37.3% had occult head trauma.¹² These studies suggest that cranial imaging is also warranted for premobile infants with suspected trauma. The American Academy of Pediatrics also has recommended that a full skeletal survey be performed on infants with suspected physical abuse.¹³ Reasoning from the studies noted above of normal bruise frequency, of occult head injury in abused infants, and of missed inflicted head injury, Hymel¹⁴ opined that bruising in premobile infants is unusual enough and has serious enough implications to warrant further evaluation.

There is not a consensus about how the extensive the hematology evaluation should be for infants with bruises, but at a minimum, a CBC (including a platelet count), PT, aPTT, thrombin time, and a fibrinogen level should be done to identify common severe coagulopathies, such as hemophilia A and B, vitamin K deficiency, thrombocytopenia, and hypofibrinogenemia.⁷ Furthermore, variable recommendations, based on clinical and family history, include studies for von Willebrand diseases, milder Factor 8 or 9 deficiency, Factor 7, 11, and 13 deficiency, α 2-antiplasmin deficiency, and collagen disorders.⁷

Although the induration over the ribs accompanying case 1's bruises led us to suspect underlying rib fractures, induration from associated subcutaneous hematomas accompanying surface bruising is also a recognized attribute of the hemophilias.⁹ Bruising may be these disorders' only initial clinical sign. Bruising and hematomas were the most frequent (52%)

presenting signs or symptoms of children diagnosed with hemophilia after the first month of life.⁹ Their bruising usually began after 3 months as mobility increased. Easy bruising during their first year of life was an unrecognized and uninvestigated symptom of 87% of severe and 30% of moderate hemophilia victims who had a late diagnosis.⁸ As such, bruises are the opportunity to diagnose and intervene in children with hemophilia before catastrophic bleeding, such as intracranial hemorrhage, occurs.¹⁵ Coagulation disorders have also been initially misdiagnosed as child abuse.⁶

Although neither of these 2 abused children had laboratory screening for abdominal injury, the American Academy of Pediatrics also has recommended screening with liver and pancreatic enzymes and a urinalysis, followed by appropriate imaging in physically abused children with fractures.¹⁶

SUMMARY

Three premobile infants with unexplained bruising are described. Although, they were asymptomatic otherwise, evaluation led to the recognition of inflicted rib fractures in 2 and hemophilia A in 1. Although such bruises are inconsequential themselves, they may provide the opportunity to recognize serious problems before major injury or morbidity occurs.

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