Patterned Abusive Bruises of the Buttocks and the Pinnae
KENNETH W. FELDMAN
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Vertical bruises of the gluteal cleft were seen in nine children. Associated bruising varied from minimal gluteal injury, through linear, horizontal bruises, to diffuse gluteal contusions. Histories documented transverse whipping or paddling, yet bruising was consistently seen vertically, parallel to the cleft. The anatomy of this very convex surface seems to create a site of shear injury between impacted and nonimpacted tissue at which vessel injury occurs, producing petechial bruising.

A rim of petechial bruising along the top of the pinna of the ear was seen in four other children. All had either historical or physical evidence of impacts to the ear. Crimping of the rim of the pinna seemed to cause this pattern.

**CASE REPORTS**

**Vertical Gluteal Cleft Injuries**

Case 1. When a 4-month-old girl was brought for day care, her grandmother observed arm and buttock bruises. Because the grandmother had seen bruises before, she brought the infant directly to the emergency department. Vertical bruises at the margin of the gluteal cleft were prominent (Fig 1A). A fine brown linear bruise crossed the gluteal crease horizontally. No vaginal or anal injuries were observed, and cultures for sexually transmitted diseases were negative. Her father later admitted spanking her bare buttocks with his open hand.

Case 2. A 5-year-old boy exhibited bilateral vertical gluteal cleft bruises. Two faint “U”-shaped petechial outlines of finger tips were seen perpendicular to the gluteal cleft. The emergency department staff were told that his mother’s boyfriend used his hand to spank the boy’s bare bottom.

Case 3. A 3-year-old girl told the emergency department staff that her mother’s boyfriend had spanked her with his hand. Vertical lines of petechiae were present at the edge of the gluteal cleft posteriorly (Fig 1B). Small clumps of petechiae were observed on the posterior margin of the labia majora. Faint, transverse linear bruising was also present on the convexity of the buttocks. The results of rectognital examination were normal, and the child did not disclose sexual abuse.

Case 4. A 20-month-old girl was brought to the emergency department for buttock bruising. Vertical confluent petechial bruising outlined the margin of her gluteal cleft on the right. Multiple small bruises were found on the small of her back. One area of horizontal linear bruising was present on her upper left buttock. All bruises were of a similar age. No explanation for the injuries was forthcoming.

Case 5. Both the 13-month-old girl and her mother were observed being slapped by her mother’s boyfriend. The infant had parallel, vertical bruises outlining her gluteal cleft and green/brown bruises on her cheek, back, and arm. A healing cigarette burn was present. The boyfriend claimed the infant had fallen down the stairs.

Case 6. A 6-month-old boy had vertical gluteal cleft bruising accompanied by prominent linear petechiae outlining finger prints on his left buttock. No other injuries were present. A live-in male babysitter cared for him while his custodial grandparents worked. The sitter claimed that the child fell in the bathtub.

Case 7. The 3 1/2-year-old girl had been at her daytime babysitter’s. During her evening bath, her mother observed buttock bruising. Diffuse petechial bruises of her left buttock, linear right buttock bruises suggestive of finger outlines, and intense vertical gluteal cleft bruises were seen (Fig 2A). The child stated and the babysitter’s husband confirmed that he had spanked her with his hand.

Case 8. A 9 1/2-year-old boy had diffuse bilateral gluteal bruising accompanied by highlights of vertical gluteal cleft bruising (Fig 2B). He reported repeated, severe beatings by his stepfather.

Case 9. The 3 1/2-year-old girl had asymmetric gluteal cleft bruising and prominent bruising of both buttocks with some lines of petechiae outlining finger prints. She had been cared for by her...
Fig 1. Vertical gluteal cleft injuries are accompanied by minor associated bruising. A, a spanked 4-month-old girl; B, a spanked 3-year-old girl.

Fig 2. Prominent bruises are present on the buttocks. Vertical gluteal cleft bruises are of equal or lesser intensity. A, a slapped 3 ½-year-old girl with linear buttock bruises suggesting finger prints; B, a beaten 9 ½-year-old boy.
mother’s boyfriend and his mother while her mother was hospitalized. Three days after her mother came home, she observed the bruising. The boyfriend’s mother claimed the girl had fallen in the park.

**Bruises of the Top of the Pinnae**

**Case 10.** A boy, aged 3 ½ years, was brought to the emergency department after a seizure. He was known to have had congenital cytomegalovirus infection and developmental delay. Fine lines of petechial bruising were observed on the very top rim of both pinnae (Fig 3A). The right ear was more injured, and bruising was also seen on its inner and outer surface. Pinch marks were present on his forearm, and unformed bruises were on his right orbit and supraclavicular region. The results of a skeletal survey were normal. In spite of concerns that the bruises were inflicted, he was returned home. Three months later he sustained fatal abusive head injuries. Old rib fractures were also found at autopsy.

**Case 11.** A 3 ½-year-old girl was brought to the emergency department by her foster mother who was puzzled by discolored skin under her left eye and on her left ear. A rim of petechial bruises was present on the top of her left pinna (Fig 3B). Grip mark bruises were seen on both cheeks. Her foster brother later admitted striking her ear.

**Case 12.** A 19-month-old boy was brought to the emergency department when he was found unarousable. His mother’s boyfriend reported that he had hit his head falling down two to three steps. On arrival he was unresponsive to pain and was breathing abnormally. He had a rim of petechiae at the top of the left ear, bruises on the inside and outside of that ear and underlying scalp, and blood behind the left ear drum. He also had bruises on his forehead, right ear, and temple, gripping bruises of both arms, and retinal bleeding. Bilateral subdural hematomas and uncal herniation were present at autopsy.

**Case 13.** A 2 ½-year-old boy was brought to the emergency department by his mother because of bruises. He had petechial bruising of the both ears including the top rims, slap marks on his face and back, scalp bruises, and traumatic hair loss. His babysitter father offered multiple conflicting explanations for the injuries and arrived at the emergency department intoxicated.

**DISCUSSION**

Neither the ears or the buttocks are injured frequently in childhood accidents. Patterned bruises usually result from inflicted trauma and reflect the shape of the injuring object. In contrast, the inflicted bruises described in this report follow anatomic lines presumably due to patterns of stress.

**Gluteal Cleft Bruises**

Nine children with gluteal cleft petechiae had physical or circumstantial evidence of spanking; cases 1 to 3, 7, and 8 exhibited both history and physical findings; cases 4, 6, and 9 manifested linear or hand print buttock bruises; and case 5 exhibited slaps elsewhere. In many of these children, the associated bruises suggest that the assailants’ hands struck the gluteal cleft transversely. However, the most prominent bruising occurred where the buttocks curve sharply into the gluteal cleft. In the first five cases (Fig 1A and 1B), the gluteal cleft bruising was dramatic, while accompanying gluteal convexity bruising was subtle and easily overlooked. In several cases this led to an initial concern that the bruising resulted from sexual abuse. However, none of these children were found to have historical or physical findings to suggest sexual abuse. For cases 6 to 9 (Fig 2A and 2B), buttock bruising was most prominent. This spectrum of bruising, the accompanying histories, and physical findings support the traumatic nature of the observed injuries.

With beating, the skin at the gluteal cleft margin may be forced into an exaggerated fold or crimped. Alternatively, a sharp junction between compressed and untouched blood vessels may cause hydrostatic...
or shearing vascular rupture. Whatever the mechanism, these findings were dramatic and consistent.

Ear Bruising

Hannigan et al described three children with ear bruising associated with retinal bleeding and fatal head injury including ipsilateral cerebral swelling. They named this the “Tin Ear Syndrome.” Although their narrative did not describe the ear bruising, their drawings of case 1 showed a similar pattern of bruising of the apical rim of the helix. They postulated that severe blows to the ear caused sufficient angular acceleration of the head to cause brain injury. Our one fatality (case 12) sustained similar intracranial injury. The skin over the mastoid beneath his ear was bruised and a hemotympanum was present, suggesting that the ear bruising resulted from an impact, not a grasp. The other three children sustained milder injuries. However, the seizure reported in case 10 might have resulted from acute traumatic brain injury instead of his preexisting seizure disorder.

The ear bruises described in this report may be quite subtle. Comatose, brain-injured children should be inspected carefully for such bruises as well as bruises on the inside and outside of the helix and the underlying mastoid. The grave implication of these bruises can be seen in the subsequent rib fractures and fatal head injury of case 9.

Although the mechanism of these bruises is also speculative, it seems likely that the extreme apex of the helix is sharply folded on itself and crimped against the head by the blow. The resulting capillary injury results in a rim of petechiae.

Conclusions

Vertical bruises of the buttocks at the margin of the gluteal cleft result from spanking or whipping. A rim of petechiae on the extreme apex of the ear may appear after the ear is boxed. These bruises conform to anatomic lines of stress, not the shape of the injuring object. They are strong indicators of physical abuse.

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KENNETH W. FELDMAN, MD
General Pediatric Division
Department of Pediatrics
University of Washington School of Medicine
The Children’s Hospital and Medical Center
Seattle, Washington

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Value of Selective Pancreatic Angiography in the Evaluation of Hyperinsulinemic Hypoglycemia in Infancy

Transient hyperinsulinemic hypoglycemia of the newborn is relatively common and is seen frequently in infants of diabetic mothers. Erythroblastosis fetalis and Beckwith-Wiedemann syndrome are less common causes. By contrast, persistent hyperinsulinism is an uncommon cause of hypoglycemia in this age group. This form of hyperinsulinemia is often caused by nesidioblastosis, a diffuse disorder of the pancreas resulting from transformation of the pancreatic ductal tissue into insulin-producing islet cells, or rarely by an islet cell adenoma, a localized proliferation of the islets of Langerhans. In one review of 160 hyperinsulinemic infants, four adenomas were reported. Because an islet cell adenoma may be very small, attempts at diagnosis and localization by non-invasive techniques such as ultrasonography, computer tomography, and magnetic resonance imaging have usually been unsuccessful. We now describe an infant with an islet cell adenoma diagnosed by angiography and emphasize the utility of selective arteriography in the evaluation of persistent hyperinsulinemic hypoglycemia of infancy.

CASE HISTORY

A 4.5-kg white male neonate developed asymptomatic hypoglycemia on the first day of life. The product of a 39-week uncomplicated pregnancy, he was born to a healthy, 28-year-old, previously nulliparous mother. The baby was delivered vaginally without complications. Apgar scores were 8 at 1 minute and 9 at 5 minutes. The initial blood glucose concentration was 1.8 mmol/L (32 mg/dL). Treatment with an intravenous infusion of 10% dextrose at a rate of 3.7 mg/kg per minute and oral feeds was initiated. He remained free of symptoms. Physical examination revealed the following: temperature, 35.6°C; heart rate, 140 beats per minute; respirations, 50/min; blood pressure, 80/50 mm Hg; weight, 4.55 kg (>95th centile); length, 51 cm (50th centile); and head circumference, 37.5 cm (90th centile). The patient was alert and active. He had no dysmorphic features. The skin was mildly icteric. Cardiac examination demonstrated a grade I/VI systolic ejection murmur which radiated to the back bilaterally. He was not jittery and there were no abnormal movements. The rest of the examination was within normal limits.

A septic workup was performed, and treatment with intravenous ampicillin and gentamicin was initiated. Laboratory studies at the time of admission to the Floating Hospital disclosed the following values: hemoglobin, 16.5 g/dL; hematocrit, 44%; platelet count, 252 000; white blood cell count, 17 200 (72 neutrophils, 5 bands, 13 lymphocytes, 8 monocytes, 2 atypical lymphocytes); sodium, 137 mmol/L; potassium, 5.2 mmol/L; chloride, 100 mmol/L; bicarbonate, 16 mmol/L; glucose, 2.1 mmol/L (37 mg/dL); and calcium, 2.3 mmol/L (9.1 mg/dL). Arterial blood gas studies revealed the following values: pH, 7.51; PO2, 22 mm Hg; and PCO2, 13 mm Hg.
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