

1. Is there bruising in the TEN region of a child less than or equal to four years of age?
2. Is there bruising in any region of an infant less than four months of age?
3. Is there a confirmed accident in the public setting that accounts for the bruising on the TEN regions or on an infant?

The model correctly classified 32 of 33 abuse victims and 32 of 38 accident victims. The one abuse victim who was classified incorrectly was a 19-month-old with an eye bruise.

**Reviewed by Lawrence Ricci, M.D.**

**Reviewer's Note:**

*Surely, child abuse pediatricians would note that there is certain bruising of the face, particularly extensive handprint bruising of the left side of the face, that would be quite discriminating in terms of inflicted or accidental trauma. Perhaps the authors are merely pointing out that nondescript bruising on face, cheek, scalp, head, and legs is common in accidental injuries as well as in abuse.*

*This fascinating study dovetails nicely with an additional report by some of the same authors described next.*

**Bruising in infants: Those with a bruise may be abused.** Mary Clyde Pierce, Stacey Smith, Kim Kaczor. *Pediatr Emerg Care* 2009;25:845-847. (from Louisville, KY)

This case report describes three cases of infants who had prior bruises that might have been termed sentinel bruises and who then subsequently returned with more serious injuries. Two of the three children died. Two of the infants were two month olds and one was three months old.

Had the previously described decision model been applied in these three cases, ideally all three children would have received comprehensive child abuse evaluations, including social screening. Occult injuries might have been identified and death in the two fatal cases and serious brain injury in the other case could, potentially, have been prevented.

**Reviewed by Lawrence Ricci, M.D.**

**Reviewer's Note:**

*It is interesting that the authors note that in all three cases the infants were described as easily bruised. The only clinical concern, apparently, was to then rule out a bleeding disorder, an incorrect decision process that I suspect many of us have run into before. The authors suggest that evaluation for any infant with unexplained bruising and/or bruising without a clear and detailed accidental causation should include a skeletal survey, head CT, trauma screening labs, abdominal CT if indicated, and retinal examination, as indicated. I would only note, however, that such an undertaking ideally should be done by a child abuse specialist, in most cases in concert with a detailed social situational assessment by the child welfare system. It also should be noted that if the ancillary workup shows negative findings, this information should never be used to determine that the initial injuries were not abusive.*

**Excluding medical and haematological conditions as a cause of bruising in suspected non-accidental injury.** A M B Minford, E M Richards. *Arch Dis Educ Pract Ed* 2010; 95:2-8. (from Leeds, UK)

In this short best practices article, the authors make the point that a mistaken diagnosis of child abuse can occur in a number of medical conditions. They offer a review of medical conditions, both hematologic and non-hematologic, that may present with bruising and be mistaken for child abuse. They go on to discuss those elements of the history and physical that are necessary to form a complete differential diagnosis, repeating the points that a history of consanguinity should always raise suspicion of a medical condition and that a child with a medical condition may also be a victim of non-accidental injury.

The authors also discuss the challenges of excluding various bleeding disorders as a cause for the clinical situation and, in so doing, they provide a review of hemostasis. They address the utility of various coagulation tests, then make recommendations regarding the extent of the coagulation investigation that should be done in a case of suspected non-accidental trauma.

Specifically, the authors propose a two-stage coagulation investigation approach with the first-stage including:

- Full blood count, examination of blood film, measurement of mean plasma volume
- Test of renal function
- Prothombin time
- Activated partial thromboplastin time
- Thrombin time and Clauss fibrinogen time
- Factor VIII and factor IX assays
- von Willebrand factor antigen, ristocetin cofactor and blood group
- Factor XII assay, platelet membrane glycoproteins (in certain situations described in the text)
- Platelet function analyzer-100 (if available).

The authors recommend that abnormal results identified in the first stage be repeated after discussion with a pediatric hematologist and that if all the first stage investigations are normal, second stage evaluations should be carried out. For the second stage investigation the authors suggest the following be done:

- Consider correction studies with normal plasma
- Factor assays - II, V, VII, VIII, IX, X
- Factor XIII (if not included with first stage investigations)
- Investigation of thrombocytopenia if present
- Platelet aggregation studies or flow cytometry in infants
- Platelet nucleotide analysis
- Alpha-2-antiplasmin level
- Plasminogen activator inhibitor-1 activity.

In concluding, the authors recognize that they are proposing more tests than are normally done in a child abuse assessment but state they feel such a thorough approach is needed to avoid the mistaken diagnosis of child abuse and to address potential legal challenges.

**Reviewed by Michele A. Lorand, M.D.**

**Reviewer's Note:**

*This article offers a short, concise review of the differential diagnosis of bruising and of potential coagulopathies to be considered in a child abuse evaluation. It contains several useful tables and, in that sense, it makes a good reference article for the clinician faced with a coagulation conundrum. It is interesting that, despite advocating for thoroughness, the*

*authors omitted any discussion of the abnormal coagulation profile in the face of abusive head trauma. The coagulation evaluation suggested is, as the authors admit, very extensive. It is based upon their experience and their sense of what should be done.*

**Non-accidental chlorpyrifos poisoning – An unusual cause of profound unconsciousness.**

Jiun-Chang Lee, Kuang-Lin Lin, Jaijn-Jim Lin, Shao-Hsuan Hsia, Chang-Teng Wu. *Eur J Pediatr* 2010;169:509-511. (from Taoyuan, Taiwan)

This is a case report of a previously healthy five-year-old boy who had two episodes of profound unconsciousness induced by chlorpyrifos, an organophosphorus anticholinesterase pesticide, while in the care of his stepmother. The boy developed abdominal pain and vomiting, apparently after drinking a soft drink.

On admission he was unconscious with dyspnea, rapidly progressing to apnea and requiring artificial ventilation. Examination revealed pinpoint pupils. Plasma pseudocholinesterase was very low. Organophosphate poisoning was suspected, although the family denied any exposure to pesticides.

His symptoms of miosis, lacrimation and salivation improved an hour after atropine treatment. He regained consciousness in two days, was extubated in five days, and was discharged after two weeks. A urine sample of the boy sent by his stepmother to a toxicology laboratory was negative for organophosphate and other known insecticides or pesticides. The differential diagnoses then were congenital cholinesterase deficiency and unknown organophosphate poisoning.

Two hours after discharge the boy was readmitted in a state similar to the first admission. This time he had eaten soup. Because the stepmother was unduly calm during both episodes, she was again asked to send a urine sample of the boy to the toxicology laboratory; simultaneously the authors, suspecting abuse, also sent a blood and urine sample from him to the laboratory directly. As the former was negative while the latter two samples were positive for chlorpyrifos,