VISUAL DIAGNOSIS
OF CHILD ABUSE

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FINANCIAL DISCLOSURES

I have no financial relationships to disclose
BRUISING

MOST COMMON MANIFESTATIONS OF PHYSICAL ABUSE
BRUISING

MOST COMMON MANIFESTATIONS OF CHILDHOOD
Wrist Ligatures
Grab Marks

Note: Not all five fingers leave a mark!
Petechiae are pinpoint hemorrhages (1-3 mm) in the skin, red, purple or brown, believed to arise from rupture of post capillary venules. May be caused by medical conditions or by elevated venous pressure\(^1\) (e.g. after severe coughing, vomiting, or strangulation) or by blunt force trauma. Bruises associated with petechiae are much more common in inflicted as opposed to accidental bruises.\(^2,3\)

Subconjunctival hemorrhage, of “unknown” etiology, in the right eye of a 5 month old child. Note the bilateral periorbital petechiae. The child also had an occipital skull fracture. No retinal hemorrhages were noted on indirect ophthalmoscopy.
HEMATOMA

Refers to a collection of blood forming a mass under the skin (or in another tissue) - like this subgaleal hematoma.

Subgaleal hematomas often occur from traction forces on the scalp, but they may also result from direct impact.
Studies of normal children reveal the ear is very rarely bruised: < 0.2 % of examinations

Ear bruising is associated with abuse in comparative studies

Kemp AM, et al. *Arch Dis Child* 2015; Jan 14;.
EAR PINNA BRUISE
THIS PATTERN REFLECTS CRUSHING OF EAR BY IMPACT AGAINST THE BONY SKULL

THIS 6 MONTH OLD PRESENTED WITH ABUSIVE HEAD TRAUMA. BILATERAL EAR BRUISING WAS NOTED ON EXAM. A PRIOR VISIT TO THE PEDIATRICIAN FOR FACIAL BRUISES WAS A MISSED OPPORTUNITY TO DIAGNOSE A “SENTINEL INJURY.”
5 YO BOY HAD MANY SHORT HYPERPIGMENTED MARKS ON BILATERAL NECK – CONSISTENT WITH FINGER NAILS MARKS

Number of marks, clustered and in protected neck region make these highly suspicious for inflicted injuries.

3 YO sister had similar marks on her neck as well as hypoxic ischemic encephalopathy, subdurals, retinal hemorrhages, and unexplained fractures.
Ten-4
Bruising Rule

Be aware of any bruising to the:

Torso
Ears
Neck

or

bruising anywhere on a child 4 months old or younger.

These bruises are significant indicators of abuse.

Bruising on babies is not normal!

Pierce and her colleagues created the “Ten Four” Rule from their study of children admitted to an intensive care unit with inflicted or accidental injury.

There is concern for abuse if there are:

Bruises on “Torso, Ears, or Neck” (TEN) in Children FOUR years old or less

OR

Any bruise on an infant FOUR months of age or less

Blunt force trauma across the buttocks can leave the appearance of linear marks parallel to gluteal cleft when the buttocks are clenched. Buttocks are rarely bruised in accidental injury (especially in the youngest children). Buttocks bruising is strongly associated with abuse in case control studies.

Kemp AM, et al. *Arch Dis Child* 2015; Jan,14; 0:1–6.
5 MONTH OLD WITH EXTENSIVE BRUIISING ON REGION OF BODY TYPICALLY COVERED WITH DIAPER
• The hand can leave an imprint when capillaries break between the fingers as blood is pushed away from the point of impact.

• Generally this creates the appearance of 2 to 3 parallel lines, though in some cases, the outline of a hand may also be noted.
Injuries that have typical parallel linear marks on the face consistent with a slap and the fact that they are BILATERAL further strengthens the identification of child abuse. The mother later admitted to slapping the baby. Full evaluation for occult injuries was negative.
SLAP MARKS

4 YO SAID FATHER HIT HIM IN THE FACE. NOTICE INVOLVEMENT OF EAR AND THE BILATERAL NATURE OF THE INJURIES.
Multiple similarly shaped marks in same body region (clustering)
Tram-track pattern is when there are two closely spaced, parallel marks.
Notice the mixture of bruising and abrasions.
Belt marks can be loops or rectangles depending on the surface that impacts the skin.
BELT MARK – SMALL PATTERN OF UNIFORMLY SHAPED MARKS IN A RECTANGULAR ARRAY REPRESENTS THE SURFACE CONTOUR OF THE BELT
NOTICE RECTANGULAR SHAPE (PARALLEL LINES AND ACUTE ANGLES)
PINCH MARKS
PINCHING AND TWISTING WITH FINGERNAILS CREATED INJURY WHICH HEALED LEAVING THESE PATTERNED SCARS.

Preteen with chronic abuse, who said at first these marks were from falling on tools. Later disclosed the stepmother had pinched and twisted skin with fingernails. Hyper and hypopigmented marks are from old inflicted injuries. She had been seen on multiple occasions with unusual bruising by the pediatrician who failed to entertain the abuse diagnosis.
PINCH MARK ON GENITALIA
Genital Injury
HUMAN BITE MARK ON FACE
Child without symptoms on being brought in to care.

“NOTHING” BRUISE
DEAD BOWEL/DEAD BABY IN 48HRS
DIFFERENTIAL DIAGNOSIS

MEDICAL CONDITIONS THAT PREDISPOSE TO BRUISES AND CONDITIONS THAT CAN BE MISTAKEN FOR INJURIES
EVALUATION OF POSSIBLE BLEEDING DISORDERS

• A complete history is critical in distinguishing between abusive injuries and cutaneous bleeding from a bleeding disorder.

• Laboratory testing suggesting the presence of a bleeding disorder does not rule out abuse. Children with medical conditions can be abused!

• If a laboratory evaluation is planned, initial testing should be guided by the prevalence of the condition being considered.

• Consultation with a hematologist should be considered especially if initial screen is abnormal.

CLUES TO THE PRESENCE OF A BLEEDING DISORDER

- Petechiae at clothing line pressure sites
- Bruising at sites of object pressure (e.g. pattern and location that fits infant seat fasteners)
- Excessive diffuse bleeding with trivial or no trauma

Bruising: Does the child need an evaluation for bleeding disorders?
Situations in which a bleeding disorder evaluation may not be needed:
- Clear disclosure of or independently witnessed abuse or nonabusive trauma
- Other medical findings consistent with abuse or nonabusive trauma
- Object- or hand-patterned bruises
- History clearly explains bruising

Clues to presence of a bleeding disorder:
- Petechiae at clothing line pressure sites
- Bruising at sites of object pressure, such as in the pattern and location of infant seat fasteners
- Severe bleeding disorders may also present with excessive diffuse bruising

2a. Initial Testing Panel
- Prothrombin time
- Activated partial thromboplastin time
- VWF antigen
- VWF activity (Ristocetin cofactor)
- Factor VIII level
- Factor IX level
- Complete blood count with platelet count

IDIOPATHIC THROMBOCYTOPENIC PURPURA
HENOCH-SCHÖNLEIN PURPURA
SYSTEMIC VASCULITIDES MAY ALSO PRESENT WITH SKIN LESIONS THAT LOOK LIKE BRUISES
CONGENITAL DERMAL MELANOCYTOSIS
(ALSO CALLED SLATE GREY NEVUS/MACULE/PATCH/SPOT, FORMERLY KNOWN AS MONGOLIAN SPOTS)
DERMAL MELANOCYTOSIS AND INFLECTED PATTERNED INJURIES – TRAM TRACK AND UNUSUAL CIRCULAR LESIONS
Striae distensae are depressed lines or bands of thin reddened skin, which later become white, smooth, shiny, and depressed. They occur in response to changes in weight or muscle mass and skin tension. They are commonly referred to as stretch marks. A clue to the diagnosis is the location in the natural skin lines.
INFANT WITH SYMMETRIC ANKLE MARKS REPORTED AS SUSPICIOUS LIGATURE

Close-up assessment reveals the fine pattern of the knitted sock. In this case the bilateral involvement actually supports the bilateral socks as the non-abusive etiology.
PHYTOPHOTODERMATITIS

Cutaneous reaction caused by light sensitizing botanical substances and UV light. For example, citrus juices (e.g. limes) eaten in the sunshine. Parent may have material on hands and touch a child leaving hand print pattern on the skin. Marks can look like bruises or burns.
TRANSIENT PIGMENTARY LINES OF THE NEWBORN

May be mistaken for inflicted linear marks, e.g. belt or cord. The clue is the location in the flexural creases!

Courtesy of Lori Frasier, MD
ACCIDENTAL ROPE INJURY ON NECK

5 YEAR OLD RAN THROUGH HANGING BEAD CURTAIN AND EXPOSED STRING
GOT CAUGHT AND WAS DRAWN ACROSS HIS NECK.
5 YO TIBETAN GIRL WITH LIMITED ENGLISH SCHOOL REPORTED BITE MARK SHE REPORTED THAT SHE FELL AND END OF SCOOTER HANDLE HIT HER IN CHEEK. CAREFUL ASSESSMENT REVEALS THE ACCIDENTAL NATURE OF THIS MARK.
These marks are caused by suction. Despite their alarming appearance, they represent a folk healing practice.
These marks are made by vigorously running a coin over the skin and also represent a folk or cultural healing practice.
KEY POINTS
THE FOLLOWING ARE KEY ASPECTS OF A COMPREHENSIVE EVALUATION:

• Well-documented caregiver history.
• Consider child developmental capability and look for inconsistencies and unrealistic caregiver expectations.
• Complete physical examination, including scalp, palms, soles, neck folds, front and back of ear.
• Additional studies to look for additional injury (e.g. skeletal survey) in children younger than 2.
• Notification of authorities for scene investigation and safety planning.
NORMAL PREPUBERTAL GENITAL ANATOMY
IMPORFORATE HYMEN
HYMENAL BRUISING
HYMENAL LACERATION

Note the acute injury to the hymen at the 6 o’clock position and the accompanying posterior fourchette injury.
MOLLUSCUM CONTAGIOSUM
ANOGENITAL WARTS

- Evaluation recommendations
  - Age appropriate interview
  - Physical examination
  - STI testing if appropriate
  - CPS referral if warranted
PALATAL BRUISING

- Victimized children are often reluctant to disclose oral-genital contact.
- Examination of the oral cavity, especially in cases of acute sexual assault, may reveal evidence of such abuse.
- This 3-year-old girl provided a detailed description of forced oral-genital penetration. The hemorrhage to the palate confirms her statement and the forceful nature of the assault.
Fig. 3. Mean home bathtub water temperature (± 2 SD) plotted on curve of duration of exposure to hot water required to cause full-thickness scalds of adult skin at various water temperatures. Adapted from Mortiz and Henriques.3
Note the “inverted triangle” shape.
PULL DOWN
BURN
GREASE SPLATTER
NOTE THE SPLATTER MARKS
GLOVE BURN
MICROWAVED FORMULA

Courtesy Nichole Wallace MD
ACCIDENTAL CONTACT BURN
Event reenacted for police.
Open wall heater in bathroom.
Lettering at correct height.
History did not waver.
Reasonable time to care.
Asphalt burns
DATING FRACTURES

The image depicts a screenshot from the dating website Match.com. The profile of thegoodlonglife is shown, with the following details:

- **About Me:** Curious, intelligent, entrepreneurial, hard-working, fun, and adventurous.
- **Online now!**
- **71 year old woman**
- **New York, New York, United States**
- **Seeking:** men 55-70
- **Within:** 50 Miles of New York, New York, United States
- **Relationship:** Divorced
- **Have kids:** Yes, they live away from home (1)
- **Want kids:** No, but it's OK if my partner has kids
- **Ethnicity:** White / Caucasian
- **Body type:** Athletic and toned
- **Height:** 5'9" (175cms)
- **Faith:** I'll tell you later
- **Smoke:** No Way
- **Drink:** Social Drinker

The image shows a bone scan of a leg.
BABYGRAM=NOOOOOO!!!!!!!
PERIOSTEAL ELEVATION IN A YOUNG INFANT VICTIM OF ABUSE
HEALING FRACTURE & PERIOSTEAL ELEVATION

Healing fracture right tibia.

Periosteal elevation left tibia & right femur.
HEALING FRACTURE LEFT TIBIA
CLASSIC CML/"CORNER FRACTURES"
TODDLER’S FRACTURE

Frequent, accidental spiral fracture in ambulatory young children.
<table>
<thead>
<tr>
<th>LOW</th>
<th>MODERATE</th>
<th>HIGH</th>
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<tbody>
<tr>
<td>Clavicle Fractures</td>
<td>Multiple fractures, esp bilateral</td>
<td>Metaphyseal lesions</td>
</tr>
<tr>
<td>Long bone shaft</td>
<td>Fractures of different ages</td>
<td>Posterior rib fractures</td>
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<tr>
<td>fractures</td>
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<tr>
<td>Linear skull fracture</td>
<td>Epiphyseal separations</td>
<td>Scapular fractures</td>
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<td>Vertebral body fractures</td>
<td>Spinous process fractures</td>
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<td>Digital fractures</td>
<td>Sternal Fractures</td>
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<td></td>
<td>Complex skull fractures</td>
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DENTAL NEGLECT

Severe dental caries of the deciduous dentition leading to abscess formation (see upper left central incisor with white arrow), pain, difficulty with proper nutrition due to sensitivity, and ultimately loss of some of teeth due the extent of the decay. Causes include poor diet with high sugar and fermentable carbohydrates and putting the child to bed with a bottle with milk, juice, or other sugary drink.
ADVICE
TULSA AREA
918-740-3390

OKLAHOMA CITY
405-271-7363
REPORTING

National Child Abuse Hotline:
1-800-422-4453

National Domestic Violence Hotline:
1-800-799-7233
THANK YOU!
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