Child Physical Abuse (Pediatrics)

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1. Prevention

Identify children and families who are at increased risk for physical abuse, and intervene to decrease risk.

1.1 Identify characteristics of children and families that are associated with an increased risk for child physical abuse, and provide appropriate support to those families.

Recommendations

- Recognize that:
  - Children with disabilities may be at increased risk for child physical abuse; be vigilant in offering support to their families.
  - Children under age 4 years are at increased risk for being physically abused, and children under age 1 year are at increased risk for fatal physical abuse.
- Recognize the following risk factors for child physical abuse:
  - Poverty
  - Substance abuse
  - Parental history of abuse as a child
  - Social isolation or lack of parental support system
  - Young parental age
  - Single-parent family
  - Presence of an unmarried, live-in partner of a single parent in the home
  - Domestic violence
  - Parental mental disease
  - History of investigated child abuse
- Identify families with one or more of the above risk factors, and provide appropriate support.
  - Utilize family resource centers to help families struggling with poverty.
  - Consider referring families with substance abuse to treatment programs, but recognize that the efficacy of substance abuse treatment programs in decreasing rates of child abuse has not been shown.
  - Consider referring young or inexperienced parents to parent education programs.
  - Refer high-risk families to home visiting programs, parent support groups, or early intervention programs.

Evidence

- In a retrospective, whole-population cohort study of almost 120,000 children, several disabilities, including cerebral palsy, moderate to severe psychological problems, speech and language disorders, and learning disabilities, were associated with an increased risk for child physical abuse, even after adjusting for gestational age, birth weight, maternal age, and socioeconomic status (1).
- A retrospective study of over 50,000 children found that children with disabilities were 3.4 times more likely to be victims of child maltreatment than nondisabled children (2).
- Based on the National Child Abuse and Neglect Data System 2004 data, children with disabilities are at 1.68 times greater risk for being victims of child maltreatment compared with children without disabilities (3).
- The NIS-4 showed that children with confirmed disabilities had significantly lower rates of physical abuse and of moderate harm from maltreatment, but they had significantly higher rates of serious injury or harm (4).
• A systematic review of population-based studies found that psychological problems, emotional problems, and learning disabilities are associated with child abuse, but the association is not necessarily causal in nature (5).

• The AAP recommends that all pediatricians be vigilant in assessing children with disabilities for signs of abuse and in offering emotional and instrumental support (6).

• A cohort study of married couples with children and at least one spouse on active duty in the U.S. Army from 1989 to 1995 found that substantiated cases of child physical abuse were more than twice as likely to occur in families with identified spouse abuse as in families without identified spouse abuse (7).

• The AAP recommends that pediatricians screen for partner violence and intervene in a safe and sensitive manner. In homes where partner violence occurs, 33% to 77% of children are also victims of physical abuse (8).

• Over 75% of the fatal cases of child abuse in 2004 occurred in children under age 4 years. The highest rate of death from child abuse occurred among children under age 1 year (3).

• Poverty, social isolation, substance abuse, and a parental history of abuse as a child have all been associated with increased rates of child abuse (9).

• The NIS-4 showed that the incidence of physical abuse among children from low-socioeconomic-status families was almost three times higher than the incidence among children not from low-socioeconomic-status families. Children living with two married biological parents had lower rates of physical abuse than children living in all other conditions. Children whose single parent had an unmarried live-in partner experienced physical abuse at 10 times the rate of children with two married biological parents (4).

• According to national data collected and analyzed through the National Child Abuse and Neglect Data System, approximately 25% of victims of child maltreatment in 2006 had been previously determined to be victims of child maltreatment by child protective services. Of the 9% to 12% of children who were substantiated or indicated victims of child maltreatment during the first 6 months of 2006, 2% to 12% were substantiated or indicated victims of abuse during the next 6 months. Children with disabilities were more likely than children without disabilities to have a recurrence of child maltreatment (10).

• In a prospective survey study of over 7000 parents, substance abuse disorders and depression were strongly associated with the onset of child physical abuse (11).

• Evaluation of the efficacy of home visitation programs for first-time mothers has shown that some of these programs can decrease the rate of child maltreatment, but other home visitation programs have not been shown to be effective (9; 12).

• In a randomized, controlled study of the Nurse Family Partnership, a home visitation program, 400 first-time mothers with sociodemographic risk characteristics were randomly assigned to receive developmental screening for their children and home nursing visits or developmental screening alone. Fifteen-year follow-up from the study showed that the mothers who received home nursing visits were significantly less likely to be identified as perpetrators of child abuse or neglect in verified child welfare reports over those 15 years (13).

• In a multicenter, randomized, controlled study, 131 at-risk pregnant women were randomly assigned to receive either standard services or weekly home health visitations from 6 months antenatally to 12 months postnatally. Assessment of mother-infant interaction at 12 months showed that the mothers in the home visitation group were significantly more sensitive to their infants and the infants were more cooperative than those in the control group. Significant differences in maternal mental health, parenting attitudes, parenting competence, and infant development were not seen. There was a nonsignificant trend toward a higher rate of identified
child abuse cases and removal of infants from the home in the visitation group than in the control group, which may be due to a detection bias (14).

- A meta-analysis of prevention programs for young children at risk for abuse and neglect found that the programs were associated with a decrease in factors related to child abuse and a decrease in child abuse and neglect (15).

- Evaluation of the efficacy of parental education programs has been mixed. Some programs have shown an improvement in parenting skills and a decreased risk for child abuse, as measured by the CAP inventory (9).

- In a prospective study of 120 teenaged mothers of lower socioeconomic status and their infants, participants were randomly assigned to home visit intervention, nursery intervention, or a control group. The mothers in the home visit intervention group received bimonthly home visits for 6 months and were trained in infant stimulation. The nursery intervention program provided the mothers with parent training, job training, and an income for working as teacher's aide trainees in an infant nursery. Assessments were conducted at 4, 8, 12, and 24 months. Infants in the intervention groups had better weight gain, developmental scores, and interaction scores than those in the control group. Infants in the nursery intervention group scored the highest on the Bayley mental and motor scales, but those in both intervention groups scored better than those in the control group (16).

- In a prospective study, 199 at-risk parents of children aged 1 to 36 months were enrolled in a clinic-based parenting education program. Parent-child interactions were assessed before and after the 8-week course in 72% of the participants. Self-reported parenting stress was assessed before and after the intervention in over 60% of the group. Self-reported parenting stress, as measured by the Parenting Stress Index—Short Form, and parent-child interaction, as measured by the Home Observation for Measurement of the Environment Inventory and the Nursing Child Assessment Satellite Teaching scale, improved significantly. There was no control group (17).

- The National Committee to Prevent Child Abuse evaluated the effectiveness of 14 child abuse prevention and parenting education programs in high-risk families in the Philadelphia area. The CAP inventory was administered to parents who participated in intensive parenting services at the start and completion of the programs. The average abuse potential of study participants, as measured by the CAP inventory, decreased, but results varied from program to program. The decrease in CAP score was greatest among individuals who scored the highest on the initial CAP inventory. CAP scores among parents with the lowest initial scores increased slightly during the study. Approximately 10% of the parents completed the CAP inventory 3 months after the program ended, and, again, an improvement in CAP scores was seen. There was no control group (18).

- In a prospective quasi-experimental study of 1408 economically disadvantaged children, participation in Chicago Child-Parent Centers was associated with decreased reports of child maltreatment by age 17 years. Chicago Child-Parent Centers is a preschool program that provides comprehensive educational support and family support to economically disadvantaged children and their parents (19).

- In a prospective study, 18 counties in a southwestern state were randomly assigned to the Triple P positive parenting program or to services-as-usual control. Three population level indicators were measured in the control and intervention counties before and after implementation of Triple P: substantial child maltreatment, child out-of-home placements, and child maltreatment injuries. All three population indicators showed significant improvements, suggesting that Triple P may be an effective population-level intervention for the prevention of child maltreatment (20).

Rationale

- Child physical abuse may be prevented by identifying children and families at increased risk for child maltreatment and offering support.
• Emerging evidence suggests that some population-level interventions such as the Triple P positive parenting program may be effective in reducing child maltreatment; such programs are not widely disseminated and are not available to most families.

Comments
• Remember that child abuse can occur in any family, even families without identifiable risk factors.
• Although there are multiple studies showing an increased rate of child physical abuse among children with disabilities, a clear causal relationship has not been shown. Also, no intervention has been proven to be effective in reducing the risk for child abuse among children with disabilities.

1.2 Provide parents of newborns with information on the dangers of shaking an infant and on strategies for coping with a crying infant.

Recommendations
• Provide to parents of newborns:
  • Strategies for coping with a crying infant
  • Information on the dangers of shaking an infant
• Have parents of newborns sign a commitment statement confirming their understanding of the dangers of shaking an infant before discharge from the hospital.

Evidence
• A study of the implementation of a hospital-based parent education program in an eight-county region in New York showed that the incidence of abusive head injuries decreased by 47% during the first 5.5 years of the program when compared with the preceding 6-year control period. The rate of abusive head trauma did not decrease significantly during the same time frame in another state where the education program was not implemented (21).
• A randomized trial of the effectiveness of educational materials designed to change maternal knowledge and behaviors about crying and the dangers of shaking a baby was performed with 2738 new mothers. The study demonstrated that the intervention increased knowledge but did not result in changes in maternal behavioral responses to crying. The study was not designed to assess whether the intervention might prevent injury (22).

Rationale
• The implementation of hospital-based programs on shaken infant syndrome has been linked to decreased rates of abusive head trauma.

Comments
• Additional replication studies are needed.
2. Screening

Have a low threshold for considering and evaluating for child physical abuse in young children presenting with injuries.

2.1 Identify injuries in children that are suspicious for abuse and perform a careful evaluation.

Recommendations

• Recognize that caregivers may intentionally or unintentionally provide misleading histories when bringing young injured victims of physical abuse for care.

• Recognize that failure of medical providers to recognize, diagnose, and report abuse in young injured children has resulted in children suffering from further abusive injuries, including fatal injuries.

• Recognize findings on history, physical exam, and radiologic studies that should raise suspicion for abuse (see Diagnosis section for details regarding specific findings that may raise concern for suspected physical abuse).

• Perform a thorough evaluation for suspected physical abuse if a child presents for care of an injury that is suspicious for abuse (see sections on Diagnosis and Consultation for Diagnosis for recommendations regarding the appropriate components of an evaluation for suspected physical abuse).

Evidence

• A 2014 clinical report from the American Academy of Pediatrics on evaluating children with fractures for physical abuse noted that certain fractures have high specificity for abuse, including rib fractures in infants, fractures of the sternum, scapula, and spinous process, and classic metaphyseal fractures of long bones. The report recommended a careful history and physical exam, as well as a skeletal survey in children younger than age 2 with a suspicious fracture (23).

• In a retrospective study of children with acute intracranial injuries, a history of a fall was provided in 12 (25%) of the cases that were determined to be abusive. A history of another traumatic mechanism was provided in 3 cases (6%), and no history of trauma was provided in 34 (69%) cases (24).

• In a retrospective study of 173 young children with abusive head trauma, the researchers found that 31% of the children had been evaluated by a physician after being injured and had been misdiagnosed. Of the children who were misdiagnosed, 28% were reinjured before being correctly diagnosed (25).

• A retrospective chart review of children younger than 3 years old who presented for evaluation and treatment of fractures demonstrated that findings suggestive of abusive trauma were missed in 23% of the children (26).

• A retrospective study of 258 children younger than 3 years old with abusive fractures revealed that 21% of the children had at least one previous physician visit at which the diagnosis of abuse was missed (27).

• In a retrospective study of 37 young victims of fatal child abuse, 7 children (19%) had visits for medical care for reasons other than routine well-child care in the month prior to their death (28).

• A retrospective study of 38 cases of abusive head trauma revealed that in 5 cases (13%) the children had previously presented for care of abusive injuries that were missed by medical staff (29).

Rationale
Multiple retrospective reviews have documented missed opportunities for medical providers to diagnose abuse in young injured patients. As a result of these missed opportunities, children have suffered from further abusive acts.

Detection and reporting of suspected abuse may protect children from sustaining further abusive injuries.

2.2 Consider performing screening for child abuse during health care visits but recognize that the effectiveness of screening for child abuse in the health care setting has not been established.

Recommendations

- Consider performing screening for abuse in both the primary care setting and in the emergency department but recognize that the efficacy of screening tools has not been well established.

Evidence

- A 2004 systematic review performed for the U.S. Preventive Services Task Force found that no trials of the effectiveness of screening for child abuse in health care settings have been published (30).
- A systematic review of trials of interventions to increase detection of abuse in emergency departments identified four studies reporting an increase in the rate of detection of suspected cases of abuse after implementation of the intervention. None of the studies documented a significant increase in the detection of cases of confirmed child abuse (31).

Rationale

- Screening for abuse in health care settings may increase detection and reporting of abuse and protect children from sustaining further abusive injuries, but the effectiveness of screening tools for increasing detection of abuse has not been established.

Comments

- Although universal screening for child abuse in the health care setting could lead to increased detection of abuse and reduced abusive injuries in children, further work is needed to assess the effectiveness of screening tools. At this time there is insufficient evidence to recommend specific target populations, methods, frequencies, or timings of screening for child physical abuse.
3. Diagnosis

Conduct a thorough and detailed history and physical exam in all children with suspected physical abuse, and obtain laboratory testing and radiologic studies as indicated based on the patient's age and presentation.

3.1 Obtain a thorough and detailed history, and identify any red flags for abuse.

Recommendations

- Identify any of the following red flags in the history that may suggest child abuse in a child with a physical injury:
  - No history of trauma is provided to explain the injury
  - The history changes with time
  - The history is inconsistent with the injury
  - The history is inconsistent with the developmental stage of the child
  - Conflicting histories are provided from different caregivers
  - An unexplained and unexpected delay in seeking care occurred
  - Injuries are attributed to home resuscitative efforts or a sibling
- Carefully document a detailed history in the medical record, including information about the mechanism, timing, and location of the trauma.
- Consider having a second person (physician, nurse, or social worker) present during the history taking to help confirm that a complete and accurate history is obtained and recorded.

Evidence

- In a retrospective study, acute intracranial injuries in 163 children were classified as “definite abuse” or “nondefinite abuse” based on radiologic, ophthalmologic, and physical exam findings. Analysis of the presenting history showed that a history of no trauma had a high specificity (0.97) and high PPV (0.92) for abuse. When the subgroup of children with persistent neurologic deficits at the time of hospital discharge was analyzed, a history of no trauma or low-impact trauma had a specificity and PPV of 1.0 for abuse. A history that changed with time was noted in 9% of the “definite abuse” cases but none of the “nondefinite abuse” cases. Caregivers attributed the injuries to home resuscitative efforts in 12% of the “definite abuse” cases and in none of the “nondefinite abuse” cases. A sibling was blamed in 18% of the “definite abuse” cases and in only 9% of the “nondefinite abuse” cases (24).
- The red flags outlined in the specific recommendations have long been recognized as risk factors for child abuse (32; 33; 34).

Rationale

- The history of how the injury occurred is an important factor in determining whether a particular child is a victim of abuse.

3.2 Conduct a thorough and detailed physical exam to look for signs of physical abuse.

Recommendations

- Look for:
  - Bruises in nonambulatory children
• Bruises in atypical locations, such as the ear, neck, face, trunk, abdomen, buttocks, hands, or soft tissue areas
• Clusters of bruises and patterned bruises
• Bite marks with an intercanine distance of greater than 3 cm
• Simultaneous deep scald burns on the buttocks, perineum, and bilateral feet
• Burns with distinct borders, uniform depth, and clear patterns
• Signs of intra-abdominal injuries, including abdominal tenderness
• Tears or hematomas on the lingual or labial frenulum
• Contusions, burns, or lacerations on the lips, tongue, buccal mucosa, or palate
• Tooth fracture, avulsion, discoloration, or displacement
• General signs of dental neglect
• Tenderness, swelling, or other signs suggestive of bone fracture
• Neurologic abnormalities that may indicate head trauma
• Failure to thrive by plotting a child's weight, height, or length and head circumference, if age appropriate, on a growth curve; compare with previous growth parameters if available
• Recognize that ambulatory toddlers typically have bruises over bony prominences, such as the anterior tibia, knees, forehead, and scalp, from accidental trauma.
• Exclude medical causes of easy bruising if multiple unexplained bruises are noted on exam.

Evidence
• In a prospective study of 973 infants and toddlers seen for well-child care visits, only 0.6% of infants less than 6 months of age and 1.7% of infants less than 9 months of age had any bruises. Only 2.2% of nonambulatory children had bruises, but 17.8% of children who were walking with support and 51.9% of children walking without support had bruises. The majority (93%) of the bruises were located over bony prominences. Less than 2% of the ambulatory children had bruises on the forearm, back, or face. Few of the children had bruises on the abdomen or hip, and none had bruises on the buttocks or hands (35).
• In a prospective study of 1467 children aged 0 to 17 years evaluated for reasons other than trauma, the majority of children aged 9 months or older had one or more recent skin injuries. In contrast, of the 246 children less than 9 months of age, only 11.4% had any recent skin injuries. The majority of skin injuries in this age group were scratches on the head and face. Only 1.2% of the children less than 8 months of age had bruises. Injuries on the buttocks, abdomen, and pelvis were uncommon in all age groups (36).
• In a case-control study of children aged 0 to 48 months admitted for trauma to the pediatric intensive care unit the following were highly predictive of child abuse: absence of a confirmed accident in a public setting; bruising on the torso, ear, or neck of a child 0 to 48 months of age; and any bruising on an infant less than 4 months of age (37).
• In a systematic review of studies defining bruising patterns in nonabused and abused children, less than 1% of nonambulatory infants were found to have bruises. Bruises associated with abuse tended to occur in multiples or clusters and were most often located on the face, neck, buttocks, trunk, and arms. Abusive bruises were often over soft tissue areas and were sometimes patterned (38).
• The percentage of burns in children that are a result of inflicted injury varies from less than 1% to 25%, depending on the study (39; 40).
• A retrospective study of 678 children admitted to a burn unit noted significant differences in the characteristics of inflicted and accidental burns. Simultaneous deep scald burns of the buttocks, perineum, and bilateral feet only occurred among children with inflicted injury (40).
• In a retrospective study of 78 children admitted to a burn unit for management of burns involving the perineum or genitals, over 45% of the children under age 2 years with scald burns were victims of child abuse (41).

• According to the AAP and the AAPD, injuries to the head, face, and neck occur in more than half of physically abused children. The AAP and AAPD guidelines state that a thorough intraoral and perioral exam is necessary in all suspected victims of child physical abuse. The guidelines also describe the types of injuries that can be seen (42).

• Although lingual and labial frena tears in infants are considered suggestive of inflicted injury, a literature review conducted in 2004 found that there was no evidence regarding the sensitivity or specificity of a torn frenulum as an indicator of child abuse (43).

• A case series described three infants evaluated in the hospital with frena tears that were not recognized as inflicted injuries. The infants were discharged home, and all three were readmitted with severe inflicted head trauma (44).

• In a retrospective study of 256 children hospitalized for physical abuse, only 2 (1%) had abdominal trauma (45).

• In a retrospective review, less than 1% of children evaluated for physical abuse had intra-abdominal injuries, but the mortality rate for those children with intra-abdominal injuries was 45% (46).

• In a retrospective study of 927 children with abdominal trauma, the mortality rate among the almost 150 victims of child abuse ranged from 9% for those with isolated abdominal trauma to 58% for those with abdominal trauma and traumatic brain injury (47).

• In a prospective study of 1095 children with a history of blunt abdominal trauma, the sensitivity and specificity of abdominal tenderness for identifying intra-abdominal injuries were 58% and 71%, respectively (48).

• In a retrospective study of fatal physical abuse among children under age 4 years, 57% of the children died as a result of blunt head trauma (28).

• In a retrospective study of 256 children admitted to the hospital for physical abuse, 53 children had head trauma, 26% of whom died and 21% of whom had neurologic sequelae (45).

• Head trauma is the number one cause of death among victims of physical abuse under age 2 years (49).

• In a retrospective study of 52 children with severe inflicted head trauma, 25% had no evidence of impact (scalp or skull injury) or history of impact provided by witnesses (50).

• In a retrospective study of 173 young children with abusive head trauma, the researchers found that 31% of the children had been evaluated by a physician after being injured and had been misdiagnosed. Of the children who were misdiagnosed, 28% were reinjured before being correctly diagnosed (25).

• In a retrospective study of 467 children evaluated for suspected physical abuse, swelling at a fracture site was a presenting feature in 26% of the children (51).

• The AAP Committee on Child Abuse and Neglect recommendations for the evaluation of suspected physical abuse in children state that the extremities, head, and ribs should be carefully palpated to identify any signs of acute or healing fractures and that growth parameters should be carefully measured and plotted because physical abuse and failure to thrive may occur together, and, in some cases, children are intentionally starved (52).

Rationale
• The presence of bruises on young, nonambulatory children and specific patterns and locations of bruises on older children may be signs of infliction trauma.
• Burns are a common form of injury. A careful review of the history and the burn characteristics
may be helpful in distinguishing inflicted burns from accidental burns. A high percentage of scald
burns involving the perineum or genitals in children under age 2 years are inflicted.

• Thorough examination of the oral cavity is necessary because the head and neck region is a
common site of injury in pediatric victims of physical abuse. Tears or hematomas of the lingual and
labial frenulum in nonambulatory children are suggestive of inflicted injury.

• Abdominal trauma is a rare but potentially life-threatening type of child physical abuse.

• Head trauma is a common cause of death among victims of child physical abuse. A careful
neurologic exam is necessary because children with inflicted head trauma may not present with a
history of head trauma or external findings or may have nonspecific symptoms.

• Bone fractures are a very common result of child physical abuse.

• Children who are victims of physical abuse may also suffer from neglect and failure to thrive.

Comments
• Accidental hot water burns are usually characterized by indistinct borders and varying burn depth.
In contrast, inflicted immersion burns tend to have distinct borders and uniform depth. Burns
inflicted with hot objects may have a clear pattern, whereas those from accidental contact often do
not have clear patterns.

• Imaging studies should be obtained to screen for occult fractures, even in the absence of physical
exam findings (see information on imaging studies for occult fractures).

• Normal neurologic exam findings in a suspected victim of child physical abuse do not exclude the
possibility of inflicted head trauma. Head imaging may be indicated, depending on the age of the
child and type of other injuries (see information on head imaging).

• Normal abdominal exam findings in a suspected victim of child physical abuse do not exclude the
possibility of inflicted abdominal injury, and further evaluation may be indicated (see information on
testing for occult abdominal injuries).

3.3 Obtain imaging studies to look for occult fractures, especially in children
under age 2 years. 

Recommendations
• In all suspected victims of child physical abuse under age 2 years, obtain a skeletal survey,
including all of the following plain radiograph views:
  • Humeri (anteroposterior)
  • Forearms (anteroposterior)
  • Hands (oblique anteroposterior)
  • Femurs (anteroposterior)
  • Lower legs (anteroposterior)
  • Feet (anteroposterior or posteroanterior)
  • Thorax including ribs, thoracic, and upper lumbar spine (anteroposterior and lateral)
  • Pelvis, including mid-lumbar spine (anteroposterior)
  • Lumbosacral spine (lateral)
  • Cervical spine (anteroposterior and lateral)
  • Skull (frontal and lateral)
• Consider obtaining oblique views of the chest in addition to the anteroposterior and lateral views in
the skeletal survey.
• Obtain a follow-up skeletal survey at 2 weeks:
To increase the diagnostic yield if abuse is strongly suspected and injuries are not identified on the initial skeletal survey

- If findings on the initial skeletal survey are not clear
- Note that skull views are not needed on follow-up skeletal survey

Consider obtaining skeletal scintigraphy as an alternative or adjunct to a skeletal survey, noting that:

- Skull radiography must be obtained in addition to scintigraphy
- Plain radiographs of any area that is concerning for a fracture on scintigraphy also must be obtained

Recognize that some fractures are highly specific for abuse, including metaphyseal fractures and rib fractures, but many types of fractures may result from either accidental or inflicted trauma.

See table Laboratory and Other Studies for Child Physical Abuse.

Evidence

- The AAP and American College of Radiology recommend a skeletal survey be done in all suspected victims of child physical abuse under age 2 years (53; 54).

- In a meta-analysis focusing on radiologic evaluation of suspected victims of child physical abuse, the yield of skeletal imaging in children under age 2 years was significant. The study found conflicting results regarding whether a skeletal survey or bone scintigraphy was more sensitive for detecting fractures but concluded that the combination of both studies was superior to either study alone. The inclusion of oblique views of the ribs increased the diagnostic yield of skeletal surveys. Repeat skeletal surveys increased the number of fractures identified, provided additional information about the age of fractures, and clarified tentative findings seen on the initial skeletal survey (55).

- In a retrospective review of 494 pediatric victims of physical abuse who had complete radiographic surveys, traumatic injuries were identified in 161 children (33%). Forty-three percent of the identified fractures were not suspected clinically. Unsuspected fractures were much more common in children under age 1 year (22%) than in children over age 1 year (9%) (56).

- In a study of 181 children who underwent skeletal surveys for evaluation of suspected physical abuse, 70 definite fractures were identified on the initial skeletal survey. Twenty-three children had skeletal surveys repeated at 2 weeks due to strong suspicion of abuse based on the history, physical exam, or initial skeletal survey findings. The repeat skeletal surveys yielded new information about the skeletal injuries in over 60% (14) of the cases and showed 19 additional definite fractures (57).

- In a study of 101 children with suspected physical abuse, skeletal surveys repeated at 2 weeks following an initial survey showed new findings in 38 children (37.6%). The spine and pelvic views on the repeat skeletal surveys did not reveal any new findings (58).

- In a retrospective review of 47 suspected victims of abuse under age 2 years who had a negative initial skeletal survey, follow-up skeletal surveys revealed signs of healing bone trauma in four cases (8.5%) (59).

- In a study of 261 suspected victims of child physical abuse, both skeletal surveys and bone scintigraphy were done. Scintigraphy of the skull was not analyzed. Of the 120 bony scintigraphic abnormalities identified, 32 were missed on skeletal surveys. In contrast, only 2 of the 105 abnormalities identified on skeletal survey were not seen on scintigraphy. In another study of 61 suspected victims of child physical abuse, 26 abnormalities were identified on scintigraphy that were not seen on skeletal surveys. Over half of the injuries missed on the skeletal survey were rib fractures. Skeletal surveys detected 13 abnormalities that were not seen on scintigraphy. Almost half of the injuries missed by scintigraphy were skull fractures (60).
In a retrospective study of 30 children suspected to be victims of physical abuse, only 35% of the metaphyseal fractures identified on skeletal survey were seen on bone scintigraphy (61).

Since the mid-1940s, when John Caffey described the presence of metaphyseal lesions in battered children with subdural hematomas, metaphyseal lesions have been reported in numerous publications and have been considered highly specific for abuse, with the exception of metaphyseal lesions from obstetric trauma in newborns (62).

A 10-year retrospective study compared the rate of identification of metaphyseal fractures on skeletal surveys in infants at low risk and high risk for abuse. Metaphyseal fractures were identified in 0% of the 42 low-risk children and in 50% of the 18 high-risk children (63).

Metaphyseal fractures have been reported in children with metabolic bone disease, including osteogenesis imperfecta (64).

In a retrospective study of 39 infants under age 1 year with rib fractures, 82% of the rib fractures were attributed to inflicted trauma. Accidental trauma involving significant force (fall from height, direct blow, or motor vehicle accident) was responsible for only 7.7% of the rib fractures. The remaining rib fractures were attributed to birth trauma or underlying bone fragility (65).

A systematic review of studies analyzing the specificity of rib fractures for nonaccidental trauma concluded that rib fractures in children under age 3 years are highly predictive of nonaccidental injury. The likelihood of nonaccidental injury as a cause of rib fractures was noted to decrease as the child's age increases (66).

In a retrospective study of 215 children under age 3 years with fractures, rib fractures were found to occur exclusively in children with inflicted injuries and not in those with unintentional injuries (67).

Rationale

Occult fractures are common in infants and young children evaluated for suspected physical abuse.

Specific injuries, such as classic metaphyseal lesions, rib fractures, and multiple fractures of varying ages, are strongly correlated with child physical abuse and may help confirm a diagnosis of abuse.

Skeletal scintigraphy generally is more sensitive than skeletal surveys in detecting bony abnormalities, particularly for detecting rib fractures; however, scintigraphy findings are less specific than radiography findings. Any abnormality detected on scintigraphy needs to be confirmed on plain radiographs. Plain radiographs also are more sensitive than scintigraphy for detecting skull fractures and metaphyseal injuries.

Follow-up skeletal surveys conducted 2 weeks after the initial skeletal survey can help clarify tentative findings on the initial skeletal survey and also may show healing injuries that were not visible in the acute stage on initial radiographs.

Comments

Consider obtaining a skeletal survey in children aged 2 to 5 years on a case-by-case basis. Skeletal surveys have a low yield in patients over age 5 years.

Results from a 2009 study suggest that if the initial skeletal survey does not show any suspected abnormalities of the spine or pelvis, the pelvic and spine views may be eliminated from the 2-week follow-up skeletal survey. The study had a small sample size (38 children) and larger studies are needed before changes to the follow-up skeletal survey protocol can be made (58).

3.4 Observe head imaging in suspected victims of child physical abuse as indicated based on their age and risk factors.

Recommendations
• Obtain:
  • Head CT or MRI, even if neurologically asymptomatic, in:
    o All infants and children with suspected intracranial injury based on history or physical exam findings
    o All children under age 2 years suspected to be victims of child physical abuse who have one or more of
      the following high-risk criteria: rib fractures, age less than 6 months, multiple fractures, or facial injury
  • Strongly consider obtaining head imaging in children under age 2 years, even if they do not meet
    any of the above high-risk criteria, including:
    • CT without intravenous contrast to identify acute hemorrhages, fractures, midline shift, and injuries
      requiring neurosurgical intervention
    • MRI in nonacute settings to assess edema, shear injuries, contusions, and subacute and chronic injuries
      and to assess the full extent of the injuries
  • See table Laboratory and Other Studies for Child Physical Abuse.

Evidence

  A retrospective review of neurologically asymptomatic children admitted to the hospital with
  injuries suspicious for abuse showed that 37% of the 51 children under age 2 years who met one
  of the high-risk criteria (rib fractures, age less than 6 months, multiple fractures, or facial injury)
  and underwent head imaging had occult head injury. Of the children with occult head injury, 74%
  had skull fractures, and 53% had intracranial injuries. Only one of the children with an occult head
  injury was over age 1 year. Over a quarter of the cases of occult head trauma were not identified
  on skeletal survey (49).
  
  A retrospective review of 51 neurologically asymptomatic children under age 2 years who were
  evaluated for suspected child abuse showed that 29% of the 75% who underwent head imaging
  had identified intracranial injuries. This study did not include children evaluated for suspected child
  abuse based on the presence of burns (68).
  
  The AAP guidelines on Diagnostic Imaging of Child Abuse state that all infants and children with
  suspected intracranial injuries must undergo CT, MRI, or both. The AAP recommends the use of CT
  in acute settings and MRI in nonacute settings (53).

Rationale

  • Infants with inflicted intracranial injuries may not have any signs or symptoms of neurologic injury.
  
  • There is a high rate of occult head injuries among young victims of child physical abuse who meet
    one of the high-risk criteria.
  
  • Imaging of the head is necessary to identify intracranial injuries that require medical intervention
    and/or monitoring or affect the child’s prognosis.
  
  • Imaging of head injuries is needed to delineate the extent of the child’s injuries and to assist in
    determining the timing of the injuries.
  
  • CT can be done rapidly and is highly sensitive for identifying acute hemorrhage.
  
  • MRI is more time consuming and often requires sedation but has a higher sensitivity and specificity
    for identifying subacute and chronic injuries.

Comments

  • The prevalence of occult head injury in older populations of children with nonaccidental injuries has
    not been adequately studied.

3.5 Consider testing children evaluated for suspected physical abuse for occult abdominal trauma, even in the absence of signs or symptoms of abdominal injuries.

Recommendations
• Consider obtaining in all cases of suspected physical abuse:
  • Serum amylase
  • Serum lipase
  • LFTs
  • Urinalysis for erythrocytes
• Obtain abdominal imaging in suspected victims of child physical abuse with symptoms, signs, or laboratory values suggestive of internal injury
• See table Laboratory and Other Studies for Child Physical Abuse.

Evidence
• In a prospective study, liver enzymes, amylase, lipase, and urinalysis were used to screen 49 victims of suspected child physical abuse for occult abdominal trauma. Four children had no evidence of abdominal trauma on history or physical exam but had elevated liver enzymes; 3 of these children had liver lacerations (69).
• In a retrospective study of 121 children with abdominal trauma, solid organ injuries were identified in 12 of 13 children with inflicted injuries. Hollow viscous injuries were identified in 6 of the 13 victims of physical abuse. Over a third of the victims of abuse had both solid organ and hollow viscous injuries, but none of the children with accidental trauma had both types of injuries (70).
• In a prospective observational study of 1676 children under 60 months of age undergoing an evaluation for suspected physical abuse, 1272 (76%) underwent transaminase testing and 54 (3.2%) had identified abdominal injuries. A threshold level of 80 IU/L for AST or ALT had a sensitivity of 77% and a specificity of 82% for abdominal injury (71).
• The AAP recommends considering obtaining serum amylase, lipase, LFTs, and urinalysis for erythrocytes in all children evaluated for suspected physical abuse (52; 72).

Rationale
• Pediatric victims of physical abuse may have significant intra-abdominal injuries that are not detected on history or physical exam.

Comments
• Solid organ (liver, spleen, kidney, and pancreas) injuries are the most common type of abdominal injury in victims of child physical abuse, but hollow viscous (small bowel, large bowel, and bile duct) injuries and even a combination of solid organ and hollow viscous injuries can occur. Mesenteric tears also may be seen.

3.6 Consider testing for toxin exposure in suspected victims of child physical abuse.

Recommendations
• Consider screening for toxins, even in the absence of signs or symptoms of toxin exposure.

Evidence
• In a review of 41 cases of intentional poisoning, 20% of the children also were victims of physical abuse (73).

Rationale
• Pediatric victims of physical abuse may also be victims of intentional poisoning or passive exposure to drugs of abuse.

3.7 Consider other possible causes of bone fracture, intracranial hemorrhage, and cutaneous lesions in children.
**Recommendations**

- Consider disorders that can cause bone fragility or mimic fractures, including:
  - Osteogenesis imperfecta
  - Vitamin D deficiency (rickets)
  - Osteomyelitis
  - Scurvy
  - Vitamin A toxicity
  - Congenital syphilitic periostitis
  - Osteopetrosis
  - Osteopenia, including osteopenia of prematurity
  - Copper deficiency
  - Menkes syndrome

- In infants with intracranial hemorrhage and no other signs of inflicted injury, consider:
  - Birth trauma as a cause of a subdural hematoma identified in an infant less than 1 month old
  - Bleeding disorders, including vitamin K deficiency, in infants with unexplained subdural hematoma, recognizing also that children with inflicted head trauma can develop a coagulopathy as a result of the brain injury
  - GA1 in infants with subdural hematomas, with or without retinal hemorrhages, and no other injuries suggestive of inflicted trauma
  - Osteogenesis imperfecta in the differential diagnosis of an infant with subdural hematomas, retinal hemorrhages, and fractures
  - Accidental injury
  - Bleeding associated with BESS

- In children with cutaneous lesions, consider:
  - Mongolian spots, Henoch-Schönlein purpura, cao gio, cupping, idiopathic thrombocytopenic purpura, erythema multiforme, and underlying congenital or acquired bleeding disorders in children with bruising
  - Bullous impetigo in the differential diagnosis of children with cutaneous burns
  - Diaper rash

- Consider self-injurious behavior, especially in children with developmental disorders.

- See table [Differential Diagnosis of Child Physical Abuse](#).

**Evidence**

- In a case report, a 2-month-old girl presenting with unexplained bilateral femur fractures was reported to social services for suspected abuse. Further evaluation showed blue sclera and radiologic findings suggestive of osteogenesis imperfecta (74).

- A study evaluated 48 children with fractures for suspected physical abuse vs. osteogenesis imperfecta. All children underwent biochemical testing for osteogenesis imperfecta, and 6 tested positive, 5 of whom had been noted to have blue sclera (75).

- In a prospective study of 111 asymptomatic neonates, MRI showed subdural hematomas in 9 infants. Most of the subdural hemorrhages were infratentorial. Infants born via forceps after failed ventouse delivery were 5.9 times more likely to have subdural hematomas than infants who were born by nontraumatic vertex delivery. None of the infants born via cesarean section had subdural hematomas. Repeat imaging showed that all of the subdural hematomas had resolved by 1 month (76).

- In a study of 97 neonates who underwent 3.0-T MRI of the head between 1 and 5 weeks of life, 17 (19%) were found to have asymptomatic intracranial hemorrhages. Sixteen of the neonates had subdural hematomas, and 1 had a germinal matrix hemorrhage. All of the intracranial hemorrhages occurred in infants born via vaginal delivery. None of the subdural hematomas were
interhemispheric, and most were infratentorial. The head imaging was obtained as part of a study on brain development and included infants born to mothers with schizophrenia, infants with mild fetal ventriculomegaly, and control infants (77).

- In a case report published in 2001, an 8-week-old boy who presented with a history of minor trauma, bilateral subdural collections, acute subdural hemorrhage, and retinal hemorrhage was placed in foster care, and criminal charges were made against the caregiver. Later, when the child developed global developmental delay and hearing loss, a diagnosis of GA1 was made (78).

- Most cases of GA1 can be detected by abnormal urine organic acids, but, in some patients, urine organic acids may be normal, and glutaryl-coenzyme A dehydrogenase analysis is necessary to make the diagnosis (79).

- Case reports have been published of infants who presented with intracranial hemorrhages suggesting possible injury but were ultimately found to have coagulopathy resulting from vitamin K deficiency, disseminated herpes simplex virus, Hermansky-Pudlak syndrome, hemophilia, hemophagocytic lymphohistiocytosis, and factor XIII deficiency (80; 81; 82; 83).

- A case report has been published of three children with osteogenesis imperfecta type I who presented with subdural hematomas and retinal hemorrhages after minor falls. All three infants had clinical features consistent with osteogenesis imperfecta, and two of the three had radiologic findings typical of osteogenesis imperfecta. Cases of intracranial hemorrhage after minor trauma in children with osteogenesis imperfecta types II and III also have been documented (84).

- In a retrospective review of 147 children hospitalized with inflicted head trauma, 54% of patients with parenchymal brain damage had a prolonged PT. Twenty percent of patients without parenchymal brain damage had a prolonged PT. Over 90% of the patients with fatal parenchymal brain injury had a prolonged PT (85).

- Bruising from bleeding disorders may be mistaken for nonaccidental trauma. (86).

- Skin lesions resulting from Henoch-Schönlein purpura, erythema multiforme, cao gio, cupping, and Mongolian spots may be confused with bruises from nonaccidental trauma (87).

- A retrospective review identified seven children with BESS who developed subdural hemorrhages. Only two of the children had a history of accidental injury. All of the children were evaluated by the hospital child protective team and were not thought to be victims of inflicted injury (88).

- A retrospective study of 45 young children with subdural hematoma and no reported history of trauma identified benign external hydrocephalus in nine cases (89).

- The specific recommendations are based on the AAP Committee on Child Abuse and Neglect guidelines for evaluating infants and young children with multiple fractures (72).

Rationale

- Physical abuse is the most common cause of multiple fractures in infants and young children, but underlying bone disorders may present with multiple fractures or bony lesions that may be mistaken for fractures.

- Although nonaccidental head trauma is the most likely cause of a subdural hematoma in an infant presenting without a history of trauma, medical causes of subdural hematoma can be mistaken for nonaccidental trauma.

- Several skin conditions may be mistaken for bruises or burns; therefore, it is important to consider other possible explanations for cutaneous lesions.

- Bleeding disorders can lead to significant bruising after minor or even no trauma and, therefore, must be considered in children with unexplained bruising before declaring physical abuse.

- Injuries from self-harm may mimic injuries from physical abuse.
Comments

- The presence of an underlying bone disorder does not necessarily exclude the possibility of child physical abuse.
4. Consultation

Consider consulting a child protective team during the evaluation of a suspected victim of child physical abuse, and consult other specialists as indicated by the type of injury. Consult specialists as indicated by the patient's injuries.\[^{BC}\]

4.1 Consider consulting a child abuse pediatrician or child protective team during the evaluation of a child with injuries suggestive of physical abuse.\[^{B}\]

**Recommendations**

- Consider consulting a child abuse pediatrician or child protective team, if available, during the evaluation of a child with injuries suggestive of physical abuse.

**Evidence**

- A survey of child abuse contact leaders at hospitals that are members of the National Association of Children's Hospitals and Related Institutions found that hospitals with child protective teams provided more comprehensive documentation and follow-up of child abuse cases than hospitals without child protective teams.\[^{90}\].

- A retrospective study of variations in rates of diagnosis of physical abuse among children under age 1 year admitted to the hospital with traumatic brain injury or femur fractures found that the rate of diagnosis of abuse was significantly lower at general hospitals compared with children's hospitals. The difference in rates of diagnosis of child physical abuse was not attributable to differences in the patients or injuries.\[^{91}\].

- A retrospective study of cases of suspected child abuse referred by child protective services to a child abuse pediatric team evaluated how often the initial non-child abuse medical provider diagnosis differed from that of the child protective team. In 42.5% of cases, the initial diagnosis of child abuse made by the non-child abuse provider was not supported by the child protective team. An initial diagnosis by the non-child abuse provider was altered by the child protective team in 42.6% of cases. As only 1.7% of child abuse cases studied by child protective services were referred to the child protective pediatric team for a second opinion, firm conclusions cannot be made and the generalizability of these findings is not known.\[^{92}\].

**Rationale**

- The presence of a child protective team in an institution has been associated with more comprehensive documentation of suspected child physical abuse.

- Consultation by a child abuse pediatric specialty team in cases evaluated for suspected abuse has been shown to sometimes result in a change in diagnosis regarding the likelihood of child abuse.

- Multidisciplinary child protective team members with training and experience in the evaluation and management of victims of child abuse and neglect may be able to provide a higher quality of care; however, no quality-control studies have been done to confirm this.

**Comments**

- The majority of pediatric hospitals with pediatric training programs have child protective teams available to assist in the evaluation of suspected victims of child abuse and neglect. Most child protective teams include, at a minimum, a child abuse pediatrician and a social worker.

4.2 Obtain an opthalmologic evaluation for retinal hemorrhage in suspected victims of child physical abuse with traumatic brain injury.\[^{B}\]

**Recommendations**
• Obtain consultation with a pediatric ophthalmologist who is experienced in the evaluation of suspected victims of abusive head trauma to look for retinal hemorrhages that are:
  - Bilateral
  - Preretinal
  - Premacular
  - Extending to the periphery
• Recognize that retinal hemorrhages may:
  - Be seen in children with severe accidental trauma and metabolic disorders but are uncommon
  - Occur during birth but resolve in the first month of life
• Recognize that retinal hemorrhages are rare in victims of physical abuse without evidence of traumatic brain injury on radiographic imaging and that ophthalmologic exam should not be considered mandatory in this population.

Evidence
• In a prospective study of 100 children aged 2 years or younger admitted to a hospital with head injuries, 10 children had retinal hemorrhages. All of the children with retinal hemorrhages were victims of inflicted trauma except for 1 child who had a fatal brain injury from a motor vehicle accident (93).
• In a prospective study of 82 children with head injuries, retinal hemorrhages were seen in 60% of children with abusive head injuries but in only 10% of children with accidental head injuries. Bilateral retinal hemorrhages were seen in 40% of victims of abusive head trauma but in only 1.5% of victims of accidental head trauma. Retinal hemorrhages classified as preretinal, premacular, or that extended to the periphery were seen exclusively in the abused children (94).
• Multiple studies have reported that retinal hemorrhages are seen in 65% to 95% of patients with nonaccidental head trauma. Retinal hemorrhages are also seen in infants less than 1 month of age born via vaginal delivery. Less commonly, retinal hemorrhages have been reported in cases of accidental trauma, in rare cases following cardiopulmonary resuscitation, and from papilledema (95).
• There are case reports of infants with osteogenesis imperfecta presenting with retinal and subdural hemorrhages after minor falls (84).
• Retrospective analysis of ophthalmologic exam results from 282 children under age 2 years who were evaluated for suspected physical abuse and had normal head imaging revealed retinal hemorrhages characteristic of abuse in only two cases (0.7%). An additional 7 children (2.5%) had a nonspecific pattern of retinal hemorrhages (96).

Rationale
• The presence of retinal hemorrhages may strengthen the suspicion of inflicted head trauma.
• Retinal hemorrhages caused by abusive head trauma tend to present differently from those occurring as a result of accidental trauma.
• Retinal hemorrhages can cause vision problems and should be followed by an ophthalmologist.

4.3 Consult a pediatric metabolic specialist if a metabolic disease that can mimic abusive injuries is suspected.

Recommendations
• Consider consulting a pediatric metabolic specialist for:
  - Infants with isolated subdural hematomas and retinal hemorrhages if GA1 is suspected
  - Infants and children with multiple fractures and clinical features of osteogenesis imperfecta or other metabolic bone diseases
Evidence

- In case reports, infants with metabolic diseases, including GA1 and osteogenesis imperfecta, were reported to child protective services for suspected abuse before the correct diagnosis was made (74; 78).

Rationale

- Metabolic specialists can help to distinguish rare metabolic disorders, such as osteogenesis imperfecta and GA1, from child abuse injuries.

4.4 Consider consulting a pediatric hematologist if a bleeding disorder that can mimic abusive injuries is suspected. 

Recommendations

- Consider consulting a pediatric hematologist for children with isolated bruising or bleeding and historical, physical, or laboratory evidence of a hematologic disorder.
- Consider consultation with a hematologist and further testing for von Willebrand's disease, dysfibrinogenemia, mild hemophilia, factor XIII deficiency, factor XI deficiency, and platelet disorders if screening test results are normal and a bleeding disorder is still suspected.

Evidence

- A paper discusses methods used to diagnose coagulation disorders in children and the difficulties involved in the investigation of easy bruising and bleeding in children. The authors conclude that the hematologist plays an essential but challenging role in such investigations (86).
- A case report describes two infants with no history of trauma whose radiographic findings were initially interpreted as nonlinear parietal fractures. Both infants had severe coagulopathy, and both died. Autopsies showed an anomalous suture in one and a connective tissue fissure in the other (80).

Rationale

- Hematologists may aid in the evaluation and diagnosis of bleeding disorders that may mimic child physical abuse.

4.5 Consult appropriate specialists for help in managing injuries sustained as a result of child physical abuse.

Recommendations

- Consider obtaining consultation with:
  - A pediatric neurosurgeon and pediatric neurologist for evaluation and management of patients with intracranial injuries
  - Physical, occupational, and speech therapists for patients with neurologic deficits from head trauma or hypoxia
  - A pediatric trauma surgeon for evaluation and management of patients with significant injuries
  - A pediatric hematologist for evaluation of possible bleeding disorders in patients with unexplained bruising or intracranial bleeding
  - A pediatric ophthalmologist for the management of retinal hemorrhages and other eye injuries
  - A pediatric orthopedic surgeon for evaluation and management of fractures
  - Burn and wound care specialists for patients with significant burns
  - A pediatric metabolic specialist for evaluation and management of patients with possible metabolic disorders, such as GA1 and osteogenesis imperfecta
  - A social worker to aid in communication with child protective services and discharge planning

Evidence

- Consensus.
Rationale

- Victims of child physical abuse may have significant injuries that require care by pediatric subspecialists.
5. Hospitalization

Hospitalize children suspected to be victims of physical abuse.

5.1 Admit any child suspected to be a victim of physical abuse to the hospital if necessary for medical or safety reasons.

Recommendations

- Admit to the hospital:
  - Suspected victims of child physical abuse for medical management as indicated by the nature and severity of the injuries
  - Medically stable children if there are concerns regarding safety and alternative placement is not available
- Obtain diagnostic studies to determine the extent of the injuries.
- Observe parent-child interactions.
- Follow the hospital's policy on caretaker visitation in cases of suspected child physical abuse.
  - Consider limiting visitation or providing supervised visits if there is concern for ongoing harm
  - Follow instructions of court orders, if applicable, regarding visitation limitations

Evidence

- The AAP recommends that if a specialized child protective center is not available, suspected victims of child physical abuse should be hospitalized during initial evaluation and treatment. Such children should remain hospitalized until they are medically stable and safe placement is identified (97).

Rationale

- Some pediatric victims of physical abuse have severe injuries that require hospitalization.
- Children who do not have injuries requiring hospitalization still may be at risk for further injury if they are discharged home. Hospitalization of these children allows for thorough and efficient assessment of their injuries while arrangements for safe placement can be made.

Comments

- Although hospitalization may be necessary for safety reasons, insurance companies may deny that the admission was medically necessary. Consultation with a local child welfare agency may identify safe alternatives to hospitalization.
6. Therapy

Use non-drug and drug therapy as required to treat injuries resulting from child physical abuse.

6.1 Use drug and non-drug therapy to treat injuries resulting from child physical abuse in the same manner as injuries sustained by other means.

Recommendations

- Use drug therapy to manage pain and drug and non-drug therapy to treat injuries from child physical abuse, including:
  - Subdural hemorrhages
  - Intraparenchymal hemorrhages
  - Extremity fractures
  - Rib fractures
  - Liver lacerations
  - Splenic hematomas
  - Bowel transection
  - Burns
  - Bruises
  - Lacerations
  - Dental injuries

Evidence

- Consensus.

Rationale

- Victims of child physical abuse may have a wide range of injuries and other disorders that should be managed in the same manner as injuries sustained by other means.
7. Patient Counseling

Provide caregivers with information about the evaluation of a child suspected to be a victim of physical abuse.

7.1 Discuss evaluation of a child suspected to be a victim of physical abuse with caregivers in a nonpunitive and nonjudgmental way.

Recommendations

- Notify caregivers of concerns regarding child physical abuse, explain medical evaluation and treatment, and discuss involvement of child protective services.
- Provide caregivers with information in a nonpunitive way.

Evidence

- In a survey of parents of children admitted to the hospital with injuries, parents of children evaluated for physical abuse felt less informed by hospital staff members about their child's care than parents of children not evaluated for abuse. Parents of children reported for physical abuse also were significantly less likely to feel that hospital staff members treated them with respect and honesty (98).

Rationale

- Caregivers should be provided with accurate and honest information, even during evaluations for suspected abuse. In some cases, a determination will be made that the child was not a victim of physical abuse.
- In other cases, the caregiver may not be the perpetrator. Even in cases in which the caregiver is the perpetrator of physical abuse, the caregiver may still be the legal guardian and may continue to provide care for the child.
- Failure to communicate with caregivers may lead to negative feelings toward medical care providers and possible hesitancy to seek medical care for the child in the future.
8. Follow-up

Report any suspected case of child physical abuse to the appropriate local child welfare agency and to law enforcement if indicated.

8.1 Report any suspected case of child physical abuse to the local child welfare agency, and work with the child welfare agency to ensure that the child is safe and receives appropriate follow-up services.

Recommendations

- In addition to providing medical follow-up for specific injuries, report any suspected case of child physical abuse to the appropriate local child welfare agency.
- Note that guidelines for reporting vary from state to state.
  - In general, a mandated reporter must make a report when he or she, in his or her official capacity, suspects or has reason to believe that a child has been abused or neglected.
  - Other state laws mandate that a report be made when the reporter has knowledge of, or observes a child being subjected to, conditions that would reasonably result in harm to the child.
- Consider reporting cases of child physical abuse to law enforcement if the injuries warrant a police investigation.
- If required, provide written or oral testimony in court based on knowledge of the facts and/or medical opinion.

Evidence

- In a randomized, controlled study, 110 physically abusive parents were randomly assigned to parent-child interaction therapy, parent-child interaction therapy plus enhanced services, or standard community-based services. Only 19% of the parents assigned to parent-child interaction therapy and 38% of the parents assigned to parent-child interaction therapy plus enhanced services were reported for child physical abuse. In comparison, 49% of the parents assigned to standard community-based services were re-reported for child physical abuse (99).
- In a randomized, controlled study, 26 maltreating mothers and their children were randomly assigned to either a 16-hour weekly parenting program or a 4-month waiting list. Assessment of parenting skills before the start of the program and at 3 weeks after completion showed that the mothers in the treatment group demonstrated significant improvement in involvement compared with the control mothers but did not demonstrate significant improvement in other parenting skills (100).
- In a nonrandomized study of female caregivers with a history of substance abuse and involvement with child welfare services due to allegations of child maltreatment, treatment for substance abuse was associated with a higher rate of further reports of child maltreatment. Due to the lack of randomization, it is not possible to determine from this study if treatment for substance abuse increases the risk for future reports or if the women who received substance abuse treatment were already at higher risk (101).
- In a randomized, controlled study of 163 families with a history of child physical abuse or neglect, enrollment in a home nursing visitation program was not associated with a decreased recurrence of child protective services reports for child physical abuse or neglect. A review of hospital records showed higher rates of recurrence of physical abuse or neglect in the treatment group (102).
- A 2005 systematic review of randomized studies of parenting programs for the treatment of child physical abuse and neglect showed that few randomized studies have examined the effectiveness
of such programs in decreasing further incidents of child abuse and neglect. The study concluded that although there was no evidence that the programs decrease child physical abuse, there was limited evidence that some programs may result in improvements in outcomes that are known to be associated with abusive parenting (103).

Rationale

- In all states and the District of Columbia, physicians and nurses are mandated reporters of child abuse. In many states, other health care workers are also mandated reporters, and in some states, everyone is a mandated reporter.
- The majority of states have laws specifying penalties, including fines or imprisonment, for mandatory reporters who fail to report suspected child abuse or neglect.
- Child welfare agencies can refer families to voluntary and/or mandatory parenting education, home nurse visitation, substance abuse treatment, and other types of programs designed to reduce the risk for further incidents of child physical abuse. Evidence to support the efficacy of these programs in reducing child abuse and neglect is limited. A few programs, including parent-child interaction therapy, have been shown to be effective in reducing future reports of physical abuse.
- Physicians may be asked to provide written reports and/or testify in court in civil and criminal proceedings in child physical abuse cases.

Comments

- All states and the District of Columbia have laws defining the role of mandatory reporters of suspected child maltreatment. In all cases, physicians and nurses are included as mandatory reporters and in many states may face penalties for failure to report suspected child physical abuse (104; 105).
- The legal definition of child abuse varies from state to state, but federal law defines the minimum standard for every state. Federal law states that child abuse and neglect is “Any recent act or failure to act on the part of a parent or caretaker, which results in death, serious physical or emotional harm, sexual abuse, or exploitation, or an act or failure to act that presents a imminent risk of serious harm” (106).
- Links to state-specific statutes regarding reporting of child maltreatment may be found at Child Welfare Information Gateway: Laws & Policies.
- The majority of states also have laws allowing for individuals who “willfully” or “knowingly” make false reports of child abuse to face penalties.

8.2 Plan appropriate follow-up for victims of child physical abuse.

Recommendations

- Do not release the child from the hospital until a safe discharge plan has been identified, ensuring that the following conditions have been met:
  - The child is medically ready for discharge.
  - Child protection services has identified a safe place for the child and has cleared a discharge plan.
- Ensure that the patient and family receive appropriate medical and psychological follow-up.
  - Provide referrals for medical follow-up services for the child as indicated by the type and severity of the injury.
  - Provide the child, siblings, and nonoffending caretaker with information for psychological evaluation and treatment when appropriate.
  - Inform the child protective services liaison of the need for follow-up.

Evidence

- Mainly consensus.
• The AAP policy on evaluating cases of suspected child physical abuse states that the physician should provide the child, sibling, and nonoffending caregiver with appropriate referrals for necessary psychological follow-up services. The primary care provider should be made aware of the needed follow-up, and child protective services should ensure that the family receives the services (52).

Rationale

• An abused child may be at risk for further injuries if discharged home.
• Victims of child physical abuse, their siblings, and caretakers may suffer from the psychological effects of physical abuse and may benefit from treatment. The reporting physician can refer the family for appropriate treatment and work with child protective services to ensure that the family receives the treatment.

Comments

• The discharge plan identified by child protective services will vary depending on the severity of the injuries, family resources, and other factors. In some cases, the child will be allowed to return home and child protective services will follow up with the family. In other cases, the child may be placed in kinship care, a nonrelated foster home, a medical foster home, a rehabilitation facility, or another medical treatment facility.
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new


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**Glossary**

**AAP**
American Academy of Pediatrics

**AAPD**
American Academy of Pediatric Dentistry

**ALT**
alanine aminotransferase

**AST**
aspartate aminotransferase

**BESS**
benevolent enlargement of the subarachnoid spaces

**CAP**
Child Abuse Potential (inventory)

**CBC**
complete blood (cell) count

**CPS**
Child Protective Services

**CT**
computed tomography

**DNA**
deoxyribonucleic acid

**ESR**
erythrocyte sedimentation rate

**GA1**
glutaric aciduria type 1

**LFT**
liver function test

**MRI**
magnetic resonance imaging

**NIS-4**
Fourth National Incidence Study of Child Abuse and Neglect

**PPV**
positive predictive value

**PT**
prothrombin time

**PTT**
partial thromboplastin time
### Tables

#### Laboratory and Other Studies for Child Physical Abuse

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<th>Test</th>
<th>Notes</th>
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<td>CBC and coagulation studies</td>
<td>Obtain CBC, PT, PTT, and thrombin time in all suspected victims of child physical abuse with bruising or intracranial hemorrhage to screen for a bleeding disorder. Further laboratory evaluation and consultation with a hematologist may be indicated if a bleeding disorder is suspected. A prolonged PT can result from inflicted head trauma (107; 86; 85; 80; 81; 82; 83)</td>
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<tr>
<td>Amylase, lipase</td>
<td>Consider obtaining in all suspected victims of child physical abuse to screen for occult abdominal trauma because normal abdominal exam findings do not exclude intra-abdominal injury (72)</td>
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<td>LFTs</td>
<td>Consider obtaining in all suspected victims of child physical abuse to screen for occult abdominal trauma because normal abdominal exam findings do not exclude intra-abdominal injury (69; 72)</td>
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<tr>
<td>Urinalysis</td>
<td>To look for erythrocytes. Consider obtaining in all suspected victims of child physical abuse to screen for occult abdominal trauma because normal abdominal exam findings do not exclude intra-abdominal injury (72)</td>
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<tr>
<td>Skeletal survey</td>
<td>Obtain in suspected victims of child physical abuse under age 2 years to detect occult fractures (51; 53; 54). Obtain a follow-up skeletal survey after 2 weeks to increase the diagnostic yield if abuse is strongly suspected and injuries are not identified on the initial skeletal survey or if findings on the initial skeletal survey are not clear (55; 57; 59)</td>
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<tr>
<td>Oblique chest radiographs</td>
<td>Consider obtaining in addition to the anteroposterior and lateral views in the skeletal survey to increase detection of rib fractures (55)</td>
</tr>
<tr>
<td>Toxicology screen</td>
<td>Children who are victims of physical abuse may also be victims of poisoning (73)</td>
</tr>
<tr>
<td>Skeletal scintigraphy</td>
<td>Consider obtaining as an alternative or adjunct to a skeletal survey, noting that skull radiography must be obtained in addition to scintigraphy. Plain radiographs of any area that is concerning for a fracture on scintigraphy also must be obtained (55; 60)</td>
</tr>
<tr>
<td>Head CT or MRI</td>
<td>Obtain imaging of the head to identify occult head injury in all infants and children with suspected intracranial injury based on history or physical exam findings. Also obtain in all suspected victims of child physical abuse under age 2 years who have one or more of the following high-risk criteria: rib fractures, age &lt;6 months, multiple fractures, or facial injury (49). Strongly consider obtaining head imaging in children under age 2 years, even if they do not meet any of the high-risk criteria (68)</td>
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CBC = complete blood (cell) count; CT = computed tomography; LFT = liver function test; MRI = magnetic resonance imaging; PT = prothrombin time; PTT = partial thromboplastin time.
### Differential Diagnosis of Child Physical Abuse

<table>
<thead>
<tr>
<th>Disease</th>
<th>Characteristics</th>
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| Child physical abuse         | See detailed lists of risk factors, red flags in history and signs on physical exam  
                                | Skeletal series can be important, especially in children <2 years old                                                                                                                                               |
| Dermal melanosis (Mongolian spots) | Blue-gray macules that can be mistaken for bruises. Most commonly occur in black, Asian, Latino, and Native American infants. Often located on the buttocks but can occur on other areas of the body. May fade during childhood  
                                | Dermal melanosis lesions have less distinct borders than bruises and do not appear red or inflamed. Bruises change in color and size over days to weeks, whereas dermal melanosis lesions will remain unchanged. Careful documentation of dermal melanosis during well-child care visits can be useful in distinguishing such lesions from future bruises (87) |
| Bullous impetigo             | Skin infection characterized by bullae and erosions with honey-colored crusts that can be mistaken for cigarette and scald burns  
                                | Cigarette burns are uniform in size, whereas the lesions of impetigo may vary in size. Cigarette and scald burns do not spread, which sometimes occurs with impetigo (87)                                                 |
| Henoch-Schönlein purpura     | The palpable purpura of Henoch-Schönlein purpura may resemble bruises. The purpura are most commonly located on the buttocks and extensor surfaces of the extremities and in children aged 2-7 years  
                                | The presence of other symptoms of Henoch-Schönlein purpura (arthritis and abdominal pain) and laboratory abnormalities (elevated ESR and elevated platelet count) distinguish Henoch-Schönlein purpura from child physical abuse (87) |
| Cao gio (coin rolling)       | Cao gio is a folk health remedy used in Southeast Asia to treat fevers and other illnesses. The skin is coated with a medicated ointment and then rubbed with a coin or other object, commonly resulting in linear petechiae and purpura on the back or chest  
                                | A history of cao gio distinguishes these lesions from injuries resulting from child physical abuse (87)                                                                                                                     |
| Cupping                      | Circular areas of erythema, petechiae, and occasionally burns can be seen on the skin after treatment with a hot cup. Cupping is a folk remedy used to treat illnesses, in which an alcohol-soaked cotton ball is ignited in the cup to form a vacuum, and then the cup is applied to the skin  
                                | A history of cupping will help to distinguish these lesions from injuries resulting from child physical abuse (87)                                                                                                         |
| Rickets                      | Dark-skinned, breast-fed infants who are not exposed to adequate sunlight and do not receive vitamin D supplementation are at increased risk for rickets. Infants with rickets may be at increased risk for fractures, and the radiologic changes commonly seen in children with rickets may be confused with fractures  
                                | Laboratory studies usually show decreased vitamin D levels, increased alkaline phosphatase, and signs of rickets on radiography, such as bone demineralization, widened epiphyses, and cupping and fraying of the epiphyses and costochondral junctions (22) |
| Osteogenesis imperfecta      | Children with osteogenesis imperfecta have defects in type I collagen that predispose them to fractures. Intracranial hemorrhages and retinal hemorrhages after minor trauma also have been reported in children with osteogenesis imperfecta. There are several types of osteogenesis imperfecta, with a wide range of severity. The metaphyseal lesions seen in victims of child physical abuse are rare in children with osteogenesis imperfecta  
                                | Signs and symptoms that may be seen in patients with osteogenesis imperfecta or in their family members include blue sclera, limb deformities, hyperextensible joints, hearing loss, triangular facies, |
Child Physical Abuse (Pediatrics)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Other rare bone diseases</td>
<td>Other uncommon diseases, including copper deficiency, Menkes syndrome, scurvy, vitamin A toxicity, congenital syphilitic periostitis, osteopetrosis, and osteopenia related to corticosteroids or other medications; may present with fractures and a minimal history of trauma or with bony lesions that may be mistaken for fractures. History, physical exam, and radiologic findings can distinguish these diseases from child physical abuse. Consider also obtaining serum copper and ceruloplasmin levels if clinically indicated. Review radiographs with a pediatric radiologist to evaluate for findings consistent with these disorders (72).</td>
</tr>
<tr>
<td>Osteomyelitis</td>
<td>Osteomyelitis of the metaphyses may initially resemble metaphyseal fractures. The metaphyseal lesions associated with osteomyelitis will become lytic appearing in time and can be distinguished from fractures. The presence of fever, elevated ESR, elevated C-reactive protein concentration, and elevated leukocyte count is typical of osteomyelitis but not inflicted trauma (72).</td>
</tr>
<tr>
<td>Osteopenia</td>
<td>Children with osteopenia may be at increased risk for accidental fractures with minor trauma. Ask about prematurity in infants under age 1 year, and identify premature infants who may be at risk for osteopenia of prematurity. Ask about paralysis, which may lead to disuse demineralization. Review radiographs with a pediatric radiologist to evaluate for findings consistent with osteopenia. Obtain serum calcium, serum phosphorus, and alkaline phosphatase levels (72).</td>
</tr>
<tr>
<td>GA1</td>
<td>An autosomal recessive metabolic disorder that can be associated with subdural hematomas and retinal hemorrhages, which may be mistaken for abusive head trauma. Clinical features of GA1 include feeding difficulties, delayed motor development, macrocephaly, dystonic-dyskinetic movement disorder, encephalopathic crisis, and delayed myelination or subependymal cysts on head imaging. Children with GA1 may have a family history of siblings with a history of GA1, unexplained encephalopathic crisis, or bilateral striatal necrosis. Children with GA1 may not develop any of the characteristic developmental delays and encephalopathy until they are 6-18 months old. Identify any of the clinical features associated with GA1, and review family history for any siblings with GA1 or symptoms of GA1. Screen for GA1 by obtaining urine organic acid analysis to look for elevations of glutaric acid and 3-hydroxyglutaric acid. Enzyme tests are needed to confirm the diagnosis. Consider consulting metabolic specialists if GA1 is suspected and urine organic acids are normal (78; 79).</td>
</tr>
<tr>
<td>Bleeding disorders (hemophilia, vitamin K deficiency, factor XIII deficiency, Hermansky-Pudlak syndrome, von Willebrand’s disease, idiopathic thrombocytopenic purpura)</td>
<td>Inherited and acquired bleeding disorders may result in significant bruising and even intracranial hemorrhage after only minor trauma or even in the absence of trauma. Obtain a detailed personal and family history for easy bleeding or bruising; look for signs of systemic illness or bleeding on physical exam; and obtain CBC, PT, and TT. Consider obtaining thrombin time. Consider consultation with a hematologist and further testing for von Willebrand’s disease, dysfibrinogenemia, mild hemophilia, factor XIII deficiency, factor XI deficiency, and platelet disorders if screening test results are normal and a bleeding disorder is still suspected (107; 86; 85; 80; 81; 82; 83; 108).</td>
</tr>
<tr>
<td>Birth trauma</td>
<td>Subdural hemorrhages may occur in infants born via vaginal delivery. The majority of subdural hemorrhages related to birth are infratentorial and resolve by 1 month of age. Subdural hemorrhages from inflicted trauma can be infratentorial but are more often supratentorial (78).</td>
</tr>
<tr>
<td>Self-harm</td>
<td>Cutaneous injuries from self-harm may mimic injuries from child physical abuse. If the injuries could have resulted from self-harm, determine if the child has a history of self-harm, and observe for any self-injurious behaviors.</td>
</tr>
<tr>
<td>Bleeding associated with BESS</td>
<td>Children with BESS may be at a higher risk for developing subdural hemorrhages from mild trauma.</td>
</tr>
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### Diaper rashes

Diaper rashes, including those from laxatives, may be mistaken for burns. During the evaluation of a child with buttock burns, obtain a history of laxative use (109).

| Diaper rashes | Review head imaging to determine if enlargement of the subarachnoid spaces is present (88, 89) |

BESS = benign enlargement of the subarachnoid spaces; CBC = complete blood (cell) count; DNA = deoxyribonucleic acid; ESR = erythrocyte sedimentation rate; GA1 = glutaric aciduria type 1; PT = prothrombin time; PTT = partial thromboplastin time.