

Trauma Reports

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The problem of child abuse is familiar to all physicians who care for pediatric trauma victims. Each year, nearly 3 million children are reported to child welfare agencies throughout the country for investigation of possible abuse. After investigation, more than 1.5 million children are determined to be victims of abuse by their caregivers.¹ Several thousand childhood deaths each year are attributed to abuse, primarily in children younger than 3 years.² The true prevalence of child abuse in this country is impossible to determine, as many maltreated children are not brought to the attention of public agencies. Both federal and state laws define child abuse and neglect, and determine the process of investigating abuse, protecting victims, and holding perpetrators responsible for crimes against children. Although legal definitions vary slightly among states, abuse can be defined broadly as childhood injuries or illnesses that result from family dysfunction. In practical terms, parental behavior that is destructive to the normal physical or emotional development of a child represents maltreatment. Child abuse results from a complex interaction of individual, family, and societal risk factors. It is a problem that occurs in association with single parenthood and poverty, although it is under-recognized in families of higher socioeconomic means.^{1,3} The concurrence of

child abuse and domestic violence is approximately 50%, with higher concurrence in households with severe domestic violence.⁴ In the hopes of identifying and protecting abused children, all state laws include medical professionals as mandated reporters of suspected abuse and neglect. This article will review the

approach to evaluation of both physical and sexual abuse and the responsibilities of the emergency physician who deals with trauma patients who are victims of child maltreatment.

— Editor's Note

Physical Abuse

General Approach to Diagnosis. The identification of child physical abuse is often

challenging. Although an occasional child will present with obvious signs of battering, more commonly a child presents with injuries that are not obvious or diagnostic. In most instances of child abuse, an accurate history is not provided by the adult accompanying the child, either because the adult is unwilling to provide the history or because he or she is not the perpetrator and does not know the history. Victims of serious physical abuse are often too young or too ill to provide a history of their assaults, and if older, might be too scared to do so. Perpetrators of the abuse often provide a false history to explain the child's injury. An unsuspecting physician may accept a false history of trauma

Recognition of Child Abuse in the Pediatric Trauma Patient

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and not consider the possibility of abuse. In order to identify abused children, child abuse needs to be included on the differential list of all pediatric injuries. In most instances, child maltreatment will quickly be eliminated from the differential, but a small dose of skepticism is needed to identify abused children.

The diagnosis of child abuse is made like all others: a careful history, complete physical examination, and supporting laboratory and radiographic data lead to a working diagnosis. In some cases, the physical examination alone indicates abuse, but in most cases, the comparison of the history of trauma and the resulting injuries suggests the diagnosis. The following are general indicators of possible child abuse:

- **Children who present with “magical” injuries.** On occasion, children are brought in for medical care with significant injuries, yet no history of trauma is identified, even when inquiry is made. Although this is acceptable for minor injuries in ambulatory children, more serious injuries, especially those to young children, should be explainable. The identification of significant injury unaccompanied by a history of trauma is cause for concern.
- **The history does not explain the injury.** This may be the most common clue to the diagnosis of child abuse, yet because the mechanism of each childhood injury differs somewhat, deciding that a history does not explain the findings can be a

challenge. This is particularly true for single injuries such as an isolated fracture. Parents who provide a false history of trauma to explain a child’s abusive injuries most commonly offer simple household trauma as an explanation. For example, infants or toddlers with abusive head injury are often said to have fallen off a bed or a couch. Older children, too scared to disclose their abuse, may provide a false history that lacks sufficient detail to explain the injury. Conversely, children are injured by unusual mechanisms. These cases often can be distinguished from abuse by the detailed history provided initially and consistently by the parent. If the history does not seem to explain the injury identified, the possibility of abuse should be considered.

- **The history changes with time.** Some parents, in an effort to explain inflicted injuries, provide various histories to explain an injury, or change the story once additional injuries are identified. The changes to the story can be extreme, and can offer evidence of maltreatment. For example, a parent who has kicked a toddler in the abdomen, leading to multiple internal organ injuries, may deny a history of trauma initially, only to reveal an accidental fall two days later when a duodenal hematoma and pancreatic injury are identified. A thorough, well-documented initial history can be important evidence in identifying and proving child maltreatment.
- **A history that does not correlate with the child’s developmental abilities.** Some abused children are said to have self-inflicted injuries, or injuries inflicted by young siblings. An understanding of child development is necessary to determine if a child is capable of causing an injury in the manner described.

- **There is an unexpected and unexplained delay in seeking medical care.** There are many barriers to obtaining health care, most of which are not related to hiding child abuse. However, in an effort to prevent detection of abuse by professionals, parents will occasionally keep their injured child at home, despite the obvious need for medical intervention. A child with a life-threatening head injury may be kept at home with the hope that the child will recover spontaneously, or children with severe burns might be treated at home to avoid public recognition of the inflicted injuries. This is distinguished from children whose presentation is delayed after accidental trauma because the seriousness of an injury was not immediately apparent. For example, a child with an accidental toddler’s fracture may not present for medical care until the child’s limp persists for a few days; skull fractures may not be obvious until the boggy swelling overlying the fracture site becomes obvious after a few days.⁵

- **The injuries are pathognomonic of child abuse.** Some children’s injuries are diagnostic of abuse. There are patterns of injuries occasionally seen in abused children that are not explainable by any accidental mechanism. These children often have multiple, old and new, or patterned injuries that are diagnostic of inflicted injury. While these children are easiest to identify, they represent a minority of the children with inflicted injury seen by physicians each year.

The initial history is often the first clue to the detection of child abuse. Obtain a detailed history, including the location, time, and mechanism of any injury described. Note the adult caregivers home at the time of the injury, and record the household composition. Document the events from the time of the

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injury leading to the medical visit. If no history of trauma is offered, but the child has an obvious injury, specifically ask if there was any trauma to the child in recent days or weeks. Document a denial of trauma by the caregivers when appropriate. If the child is verbal and able to talk, interview the child separately from the parents. It is helpful to have a nurse, social worker, or another professional present at the time of the interview to ensure a complete and accurate account of the history.

The physical examination of the child must be complete. Examine all surfaces of the child's skin carefully, and document any injuries. In infants, subtle external injuries are often a clue to more serious internal injury, and should not be dismissed.⁶ Bruises, burns, and scars should be measured, and their size, shape, location, and color recorded. Photographs are an important adjunct to the recorded physical examination, but are not an appropriate substitute for accurate medical documentation.⁷

Laboratory and Radiographic Data

Abused children often have occult injuries, and some medical diseases may mimic abuse. Therefore, the laboratory and radiographic evaluation of the abused child is guided not only by the history and physical examination findings, but also by the above considerations. Necessary laboratory and/or radiographic testing varies by age, injury pattern, and severity. The following studies may be appropriate in the evaluation of an abused child.

Laboratory Studies. Hematologic Evaluation. A complete blood count (CBC) with platelet count, prothrombin time (PT), and partial prothrombin time (PTT) are indicated for children who present with bleeding or bruising. Elevations of PT and PTT may be the result of severe inflicted head injury.⁸ Additional screening tests, such as a bleeding time, are occasionally done, but have not been fully evaluated as an effective screening test in cases of abuse.

Liver Function Tests/Pancreatic Enzymes. Alanine aminotransferase (ALT), aspartate aminotransferase (AST), amylase, and/or lipase may be elevated with acute liver or pancreatic injury. Such injuries can be asymptomatic, and screening is recommended for injured infants and children in whom the abdominal examination may not be a sensitive indicator of injury.⁹

Urinalysis. The urinalysis is used as a screen for renal or bladder trauma, and can detect myoglobinuria secondary to rhabdomyolysis from severe beatings.

Toxicology screens are indicated for infants and children with unexplained neurological symptoms.

Diagnostic Imaging. Roentgenographic Skeletal Survey. The skeletal survey is an important adjunct to the evaluation of abused infants and toddlers, and is indicated for *all* children younger than 2 years with any suspicious injury. Guidelines for the appropriate imaging methods have recently been updated by the American Academy of Pediatrics.¹⁰

Radionuclide Bone Scan. A bone scan identifies areas of increased bone turnover, and is a sensitive method for detecting rib fractures less than 7-10 days old, subtle diaphyseal fractures, and early periosteal elevation. Bone scan is most commonly used as an adjunct to the skeletal survey when abuse is strongly suspected and the skeletal survey is normal. Conversely, the skeletal

survey can be repeated 3-4 weeks after the initial survey to increase the detection of healing injuries.¹¹

Computed Tomography (CT) Scan. A CT scan is the method of choice for diagnosing acute intracranial, pulmonary, and solid abdominal organ abnormalities in children with serious injuries.

Magnetic Resonance Imaging (MRI). MRI scans of the brain are more sensitive than CT scans in detecting certain traumatic injuries, including axonal shearing, cortical contusions, and brain-stem injuries.¹² MRI is used as an important adjunct to the CT scan of the brain in children with inflicted head injury. MRI is indicated for infants with unexplained rib and/or metaphyseal fractures, both of which are caused by mechanisms that may be associated with brain injuries.

Ultrasound. Although sonography does not replace CT or MRI imaging in the evaluation of suspected abuse, it can be a useful tool for evaluating a severely ill, acutely injured child. In addition to detecting intra-abdominal injury, sonography can identify subdural hemorrhage and frontoparietal white matter tears in the infant with head injury, and may be used to assess epiphyseal injuries in long bones.^{13,14}

Manifestations of Physical Abuse

Abusive injuries may affect any organ system in the body, alone or in combination. The following are common manifestations of child abuse.

Bruises. Although bruises are universal in ambulatory children, they also are among the most common injuries identified in abused children.¹⁵ A subtle bruise may be the sole external indication of more significant internal trauma. Bruises that are patterned, such as looped marks, belt marks, or handprints, are indicators of inflicted injury. Bruises in an unusual distribution, such as those isolated to central surfaces of the body, are cause for concern. Bruises in non-ambulatory infants are extremely uncommon, occurring in approximately 1% of healthy infants.^{6,16} Children with multiple bruises of different ages may be victims of abuse. However, the dating and aging of bruises is inexact, and should not be the sole determinant in diagnosing abuse.¹⁷ There are a number of medical illnesses associated with bruising that can be mistaken for child abuse. Idiopathic thrombocytopenic purpura (ITP), hemophilia, vitamin K deficiency, and other coagulopathies may present with excessive bruising or bleeding.¹⁸ Henoch-Schölein purpura (HSP) is associated with non-thrombocytopenic petechiae and purpura located primarily on the buttocks and legs. Mongolian spots, other birth marks, and cultural practices, such as coining, may be mistaken for abuse.¹⁹ If bruises are thought to be the result of abuse, record their size, shape, location, and color. If a bleeding diathesis is suspected, screen with a CBC, platelet count, PT, PTT, and a bleeding time.

Burns. Burns are a common accidental injury in childhood, and only a small minority of burns are associated with abuse.²⁰ Inflicted burns are more common in young children.²⁰ Some burn patterns are highly specific for inflicted injury. (See Figure 1.) Immersion burns may occur after soiling accidents or other behaviors that require cleaning the child. They are most commonly inflicted on toddlers. The child is submerged into scalding water, leaving a burn pattern not seen in accidental injury. Areas of skin

Figure 1. Immersion Burn



Photo shows a 1-year-old with second-degree immersion burns to buttocks. The child was placed in a sink of scalding water.

submerged under the water, including the feet, lower legs, buttocks and genitals are burned with clear lines of demarcation, while areas above the water line are spared.²¹ Immersion burns can be accidental, and are differentiated from inflicted injury by unclear burn margins, and a history that is developmentally appropriate and consistent with the injury seen. Burns may be inflicted by contact with hot solids, such as irons, radiators, stoves, or cigarettes. Inflicted burns are characteristically symmetric, deep, and leave a clear imprint of the hot instrument. Dermatologic and infectious diseases can mimic abusive burns, including toxin-mediated staphylococcal and streptococcal infections, impetigo (which can be mistaken for cigarette burns), and phytophotodermatitis, which is caused by the interaction of citrus and sun on the skin.^{19,22} Inflicted burn injuries require the same treatment as any burn, but children with inflicted burns have a higher morbidity and longer hospital stays than children with accidental burns. A skeletal survey is usually indicated for children with inflicted burns.

Fractures. No single fracture is pathognomonic of child abuse. Diaphyseal fractures are most common in both accidental and abusive injuries.²³ Inflicted fractures are more common in infants and young children, but can be seen in all ages. Once children become ambulatory, accidental fractures become more common.²⁴ Certain patterns of fractures should increase the concern for abuse, including multiple fractures and fractures of different ages. Although exceptions exist, multiple, bilateral rib fractures in infants are almost always the result of abuse, and are caused by severe squeezing of the chest.^{25,26} Metaphyseal, vertebral, scapular, and other unusual fractures are highly suspicious for inflicted injuries. Diseases such as rickets, osteogenesis imperfecta, congenital syphilis, or osteomyelitis can mimic abusive injuries. Most have other clinical manifestations that distinguish them from abuse, and may be diagnosed by simple blood tests. The diagnosis of osteogenesis imperfecta is dependent on biochemical analysis of cultured skin fibroblasts.²⁷ Young children with suspicious fractures must have a skeletal survey. Although a negative survey does not eliminate the

possibility of abuse, additional fractures identified by a skeletal survey can be diagnostic of inflicted injury. (See Figures 2a and 2b.)

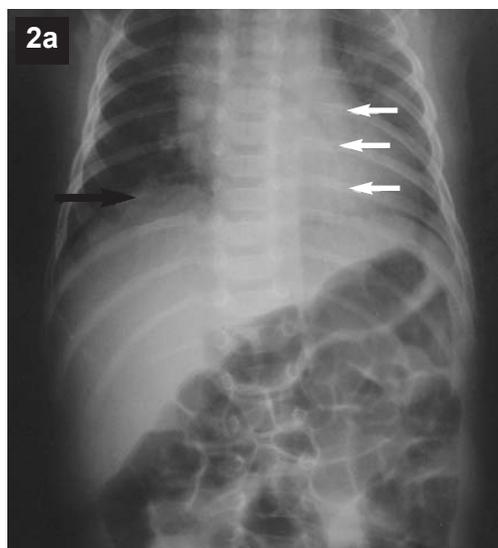
Abdominal Trauma. Severe abdominal injury is an uncommon, but well recognized, manifestation of abuse. The history is almost always misleading, and rarely includes a history of abdominal trauma. Less severe injury is under-recognized and under-reported, because symptoms are non-specific and external indications of abdominal trauma are often lacking. Even with severe injury, external abdominal bruising is seen in only 50% of cases.²⁸

Most abusive abdominal injury is caused by blunt trauma, resulting in solid organ injury, perforation of hollow viscous, or shearing of mesenteric vessels. Isolated solid organ injuries are most common with both accidental and inflicted injuries, although hollow visceral injuries are more commonly associated with abuse.²⁹ The small size of the child's abdomen predisposes them to multiple organ injury. The timing of presentation varies according to injury. Children with severe liver or mesenteric injury present with signs and symptoms of acute bleeding, including hemorrhagic shock.²⁸ Children with intestinal perforation present with signs of peritonitis. Their presentation for medical care can be delayed by hours or days, but an accurate history (often lacking) should include progressive abdominal symptoms.³⁰

Abused children occasionally have asymptomatic abdominal injuries, which can be detected with evaluations of serum liver function tests (LFTs), amylase, and lipase.⁹ Abdominal trauma is diagnosed by physical examination, screening LFTs, amylase, lipase, urinalysis, sonography and abdominal CT. Solid organ injuries are most commonly treated conservatively, but hollow viscous injuries require surgical repair. When stable, children with inflicted abdominal injuries require a skeletal survey to search for the presence of additional inflicted injuries. Children who survive the initial abdominal trauma usually recover, although the morbidity associated with abdominal injury can be significant.

Head Trauma. Brain injury, either as a result of blunt impact, shaking with sudden deceleration, or both, is the leading cause of mortality and morbidity from physical abuse. Since the first modern description of abusive head trauma, much has been learned about the mechanism of cranial and cerebral injury. In general, focal impact to the head results in focal injury, including scalp bruising, subgaleal swelling, skull fractures, and/or cerebral contusions.³¹ Alternatively, significant angular deceleration, such as that associated with shaking, causes more diffuse cerebral injury, including subdural hemorrhage and diffuse axonal injury.³² Child abuse can result in any of these injuries. The relative contribution of shaking vs. blunt impact in causing the "shaken baby syndrome" has been debated by researchers and clinicians.^{33,34} Although many believe that shaking alone can cause serious or even fatal injury, biomechanical studies suggest that the combination of angular and direct forces is needed to cause the clinical findings associated with abusive head trauma.³³ Scalp bruising may not always be evident because rapid deceleration into a padded surface may not cause external head injury.³⁵ Many children diagnosed with "shaken baby syndrome" have evidence of blunt head injury clinically or at autopsy. Thus, the term "shaken baby syndrome" is often used inaccurately, and is

Figures 2a and 2b. Acute Rib Fracture



2a. A 3-month-old was found to have facial bruises. Skeletal survey revealed multiple, acute left-sided posterior rib fractures (note white arrows) and a healing rib fracture of the right 8th rib (note black arrow). Acute rib fractures are difficult to identify.

2b. Follow-up chest radiograph taken about one month later. Note the almost complete healing of the right rib fracture, and the callous formation along four of the left posterior ribs.

The hemorrhages may be unilateral or bilateral, and often involve multiple layers of the retina.⁴³ The precise pathophysiology of retinal hemorrhages in abusive head trauma is unknown, but may be related to tractional forces to the globe, sudden rise in intracranial pressure, or extension from intracranial hemorrhage.⁴³ All victims of abusive head trauma require a skeletal survey. The identification of skeletal injuries is diagnostic of inflicted injury in the setting of unexplained cerebral injury. Classic skeletal injuries associated with abusive head trauma include rib fractures (from pressure to the chest during shaking) and metaphyseal fractures (due to shearing forces on the metaphyses of the long bones). The diagnosis of inflicted head injury does not require the identification of skeletal trauma.

Despite attempts to treat the uncontrolled intracranial pressure that often results from abusive

better replaced by a more generic term that describes inflicted, non-accidental head trauma.

Victims of abusive head injury are generally younger than 3 years, and most are infants.³⁶ Perpetrators tend to be men (fathers and boyfriends), although mothers, babysitters, and other caregivers are not immune.³⁷ The impetus for the abuse is almost always a baby's uncontrolled crying, and the subsequent loss of control by the caregiver. The child's symptoms vary from mild lethargy and irritability to coma, and a history of trauma is often lacking. When offered, reported trauma is minor, such as a fall off the bed or couch. Studies suggest that with the exception of the occasional epidural hemorrhage, life-threatening intracerebral injury from documented short falls is not reported in the literature.^{38,39}

Unsuspecting physicians may fail to recognize mild neurological findings as signs of head injury. One group found that more than 30% of infants with abusive head injury and symptoms of their trauma were seen by physicians and given an incorrect diagnosis.³ More than 25% of these victims were reinjured, a few of them fatally, before the correct diagnosis was made. Infants younger than 6 months of age, those without seizures or respiratory arrest, Caucasian children, and those who lived with two parents were most likely to be misdiagnosed. These results stress the need for objectivity and open-mindedness when caring for young children.

CT scans of the head typically reveal subdural hemorrhage, which often lies in the posterior interhemispheric fissure.⁴⁰ (See Figure 3.) Cerebral edema and subsequent infarction may not be present initially, but are a common secondary consequence of severe injury.^{41,42} The majority of infants with abusive head injury have retinal hemorrhages when examined by an ophthalmologist.

cerebral injury, victims have worse outcomes than children with accidental head injury.⁴⁴ Children with global, bilateral cerebral edema and loss of cisterns have an especially poor prognosis for recovery.³⁵ Death is usually due to uncontrolled intracranial pressure.

Child Sexual Abuse

Child sexual abuse is pervasive problem in this country. Despite the difficulty in establishing accurate prevalence, researchers estimate that between 1% and 10% of children are sexually abused during childhood.⁴⁵ Sexual abuse can best be defined as the involvement of children in sexual activities that they cannot understand, are developmentally unprepared for, cannot give informed consent to, and that violate societal taboos.⁴⁶ Sexual abuse can involve both contact and non-contact activities, and often escalates over time. Unlike adult rape, which is often a physically violent act, child sexual abuse involves coercion and manipulation of a child's trust, and is less often a violent physical assault on the child. Perpetrators of sexual abuse include men, women, and children. The perpetrator is usually an individual who has ongoing access to the child, such as a relative, teacher, family friend, member of clergy, etc. Stranger assaults occur with less frequency, and tend to be more physically violent. In cases of ongoing abuse, the perpetrator strives to maintain secrecy with the child through bribery or threats, and is often successful in preventing disclosure by the child.⁴⁷ Identification of sexual abuse is made in many ways:

- **The child discloses the abuse.** Verbal disclosure by the child can occur after a single episode of sexual abuse, but more

often occurs after repeated assaults. The child may disclose ongoing, active abuse, or may wait until the perpetrator has left the child's environment. The child's disclosure can be to an adult (parent, teacher, relative, or friend) or to another child. The child's verbal history is the most important piece of evidence in the evaluation of sexual abuse, and information about the timing and details of the disclosure need to be documented.

- **The child manifests nonspecific behavioral symptoms.** Children are often brought for evaluation of possible abuse because of non-specific behaviors worrisome for abuse. Sexually abused children may exhibit a wide range of behavioral problems, including withdrawal, signs of depression, aggressiveness, hypersexualized play, poor school performance, or truancy. Alternatively, they may appear to be well-adjusted, healthy children. Consider the possibility of sexual abuse when evaluating all children with unexplained behavioral problems. Ultimately, the diagnosis of sexual abuse will be dependent on the child's ability to make a disclosure of abuse.

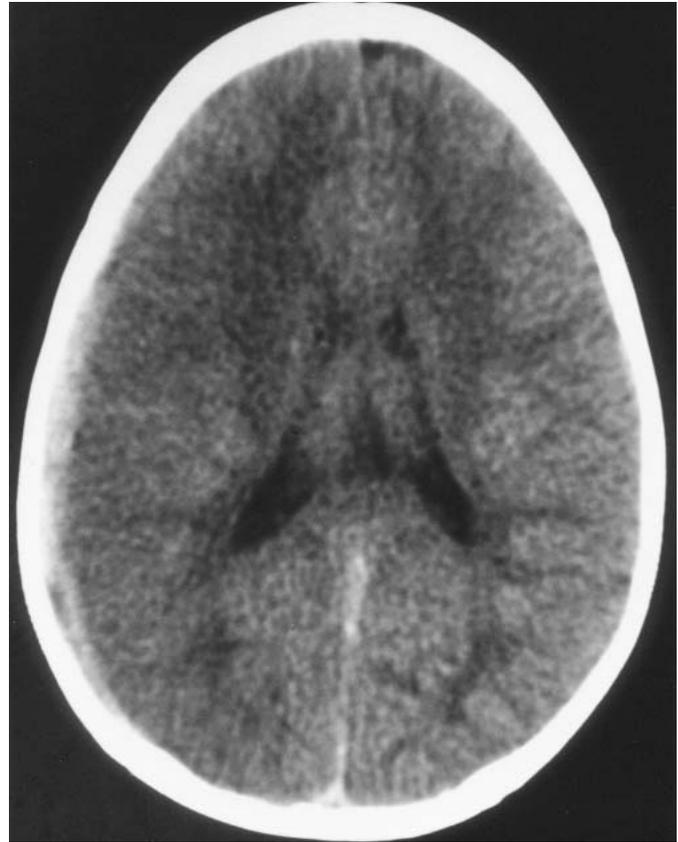
- **A third party observes the sexual abuse.** On occasion, a parent, sibling, or other household member unexpectedly interrupts an episode of sexual assault. In this situation, the child should have an immediate medical examination to assess for acute injury and to collect forensic evidence.

- **The child presents with unexplained genital injury.** Infrequently, a child will present for medical care with an unexplained genital or anal injury. Care must be taken, however, before ascribing isolated physical problems to sexual abuse, as most physical complaints related to the genitals are unrelated to sexual assault. Researchers reviewed the medical records of 197 children referred to a sexual abuse clinic for evaluation of isolated physical genital problems.⁴⁸ Although the children were thought to be sexually abused because of their genital problems, none displayed behavioral problems or disclosed a history of sexual abuse. The authors found that only 15% of this population had a final diagnosis even suggestive of sexual abuse, yet 65% of the children had already been reported to social services for investigation. Although sexually abused children can present for medical care with unexplained injuries, the differential diagnosis of genital problems (bleeding, discharge, pain, etc.) is extensive, and a basic knowledge of pediatric gynecologic medicine is needed to properly evaluate children with genital complaints. (See Table 1.)

- **The child presents with a sexually transmitted disease (STD).** Children with STDs not explained by maternal transmission or consensual sexual activity (adolescents) should be considered possible victims of sexual assault. The specificity of sexually transmitted diseases for sexual abuse varies by organism, the age of the child at presentation, and the maternal history of previous disease.⁴⁹ Sexually transmitted infections are uncommon in children, and accurate diagnosis is dependent on proper methods of evaluation.^{50,51} In general, children properly diagnosed with an unexplained STD deserve a careful evaluation for the possibility of sexual abuse.

The Medical Evaluation. All children who are suspected victims of sexual abuse require a medical evaluation. The approach to the visit is dependent on the age of the child, the timing of the

Figure 3. Subdural Hemorrhage



The CT scan of an 8-month-old infant who presented for care with seizures reveals an acute subdural hemorrhage located in the posterior interhemispheric fissure and along the right parietal convexity. There is also loss of gray-white differentiation in the parenchyma underlying the subdural blood.

examination relative to the last assault, and whether the abuse has been investigated prior to the examination. Upon disclosure, some parents bring their child immediately for a medical evaluation. Others call the police or notify child welfare. If the police and/or a child welfare social worker have not interviewed the child prior to the medical evaluation, it is the physician's responsibility to obtain and carefully document the child's history. If the authorities have interviewed the child previously, it is sometimes possible to obtain needed information from the police or child welfare social worker so that the child can be spared from unnecessary interrogation.⁵² If the diagnosis is unsuspected prior to a medical visit, a complete interview is necessary. As a general rule, the interview of the parents and child should occur separately, and if possible, should occur in a quiet, controlled environment.

The Parent's Interview. The objectives of the interview with the child's parent are to obtain information about what is known of the sexual abuse, obtain a complete medical history, explain the steps of the medical evaluation, and provide reassurance when appropriate. Parents who have learned about the abuse prior to the medical visit usually need time to discuss their con-

Table 1. Differential Diagnosis of Pediatric Genital Problems

VAGINAL/PENILE DISCHARGE

- **Non-specific vulvovaginitis**
- **Infection**
 - Sexually transmitted infections (i.e., *Neisseria gonorrhoeae*, *Chlamydia trachomatis*, *Trichomonas vaginalis*)
 - Group A streptococcus
 - Haemophilus influenzae*
 - Staphylococcus aureus*
 - Cornebacterium diphtheriae*
 - Mycoplasma hominis*
 - Gardnerella vaginalis*
 - Shigella (may be bloody)
- **Physiologic**
 - Leukorrhea
- **Structural abnormalities**
 - Ectopic ureter
 - Rectovaginal fistula
 - Draining pelvic abscess
- **Trauma/Irritation**
 - Foreign body
 - Bubble bath or other chemical irritants
 - Tight, nonporous clothing

GENITAL BLEEDING

- **Infectious**
 - UTI (with gross hematuria)
 - Vaginitis
- **Structural**
 - Vaginal polyp
 - Urethral prolapse
 - Vulvar hemangioma
- **Trauma/Irritation**
 - Straddle injuries (usually anterior lacerations)
 - Impaling (penetrating) injuries
 - Foreign body (toilet paper, toys, etc.)
- **Dermatologic**
 - Atopic dermatitis

- Contact dermatitis
- Seborrhea
- Diaper dermatitis
- Lichen sclerosis et atrophica (female)
- Balanitis xerotica obliterans (male)

- **Endocrinologic**
 - Neonatal estrogen withdrawal
 - Precocious puberty
- **Oncologic**
 - Sarcoma botryoides
 - Estrogen producing tumors

GENITAL INFLAMMATION/PRURITIS

- **Infectious**
 - Non-specific vulvovaginitis
 - STDs
 - Pinworms
 - Scabies
 - Candida
 - Group A Streptococcal perianal cellulitis
- **Trauma/Irritation**
 - Poor hygiene
 - Poorly ventilated and/or tight underwear
 - Chemical irritation
 - “Sandbox” vaginitis
- **Dermatologic**
 - Atopic dermatitis
 - Contact dermatitis
 - Seborrhea
 - Diaper dermatitis
 - Psoriasis
 - Lichen sclerosis et atrophica (females)
 - Balanitis xerotica obliterans (male)
- **Systemic Disease**
 - Urticaria
 - Crohn’s disease
 - Kawasaki’s syndrome
 - Stevens-Johnson syndrome

BRUISING

- **Infectious**
 - Purpura fulminans
 - Disseminated intravascular coagulation (DIC)
- **Trauma**
 - Straddle injuries
 - Accidental penetrating injuries
- **Dermatologic**
 - Lichen sclerosis et atrophica (female)
 - Balanitis xerotica obliterans (male)
 - Erythema multiforme
 - Mongolian spots
 - Vascular nevi
 - Phyto dermatitis
- **Hematologic Diseases**
 - ITP
 - Leukemia
 - Vitamin K deficiency
 - Coagulopathies
 - DIC
- **Autoimmune Diseases**
 - Henoch-Schonlein purpura
 - Vasculitis

ANATOMIC VARIATIONS

- **Acquired**
 - Labial agglutination
 - Hair thread tourniquet syndrome
 - Phimosis
 - Paraphimosis
 - Urethral prolapse
- **Congenital**
 - Septated hymen
 - Cribiform hymen
- **Microperforate hymen**
 - Imperforate hymen
 - Urethral caruncles
 - Vestibular bands
 - Median raphe
 - Ectopic ureterocele

cerns and fears. Remember that the diagnosis of sexual abuse represents a crisis for the entire family, especially if the perpetrator is a household member. If the parent is unaware of the abuse prior to the medical visit, it is important to introduce the possibility in a non-accusatory, objective, and professional manner. A statement such as, “Mrs. Smith, I have seen other children with similar complaints or findings as your child, and sometimes the problem results from sexual abuse. Do you have any concerns or suspicions about that possibility?” is an effective groundbreaker. This approach allows the parent to disclose any concern they may have. This conversation should take place privately, to limit what is said in front of the child.

The Child’s Interview. The history provided by the child is

the most important component of the sexual abuse evaluation. If the child has not already been interviewed, this should be done in a quiet environment. Some children are developmentally capable and willing to provide a history of their abuse, but others are too young or are unwilling to do so. If the child will separate from the parent, conduct the interview with the child and a third party. This additional person can clarify and record the child’s statements. After assessing the child’s basic developmental abilities (through general conversation), the reason for the visit can be established. Interview the child using language that is developmentally appropriate. The initial questions should be open-ended; allow the child to provide a narrative. Additional questions will clarify previous statements made by the patient, but leading questions are never

Table 2. Classification of Genital Findings**CLASS I: NORMAL**

- Peri-urethral bands
- Longitudinal intravaginal ridges
- Hymenal tags
- Hymenal bumps
- Linea vestibularis
- Hymenal cleft/notch in the anterior half of the hymenal rim
- External hymenal ridge

CLASS II: NORMAL VARIANTS

- Septate hymen
- Failure of midline fusion
- Groove in the fossa in a pubertal female
- Diastasis ani
- Perianal skin tag
- Increased peri-anal skin pigmentation

CLASS II: NON-SPECIFIC FINDINGS

- Erythema (redness) of the vestibule or peri-anal tissues
- Increased vascularity
- Labial adhesion
- Vaginal discharge
- Friability of the posterior fourchette or commissure
- Thickened hymen
- Condyloma accuminata in a child younger than 2 years of age
- Anal fissures
- Flattened anal folds
- Anal dilatation with stool present
- Venous congestion or venous pooling
- Vaginal bleeding
- Enlarged hymenal opening

CLASS III: CONCERNING FOR ABUSE/TRAUMA (INSUFFICIENT DATA EXISTS TO INDICATE THAT ABUSE IS THE ONLY CAUSE)

- Immediate anal dilation (occurs within 30 seconds) of at least 20 millimeters, in the prone knee-chest position, with stool not visible or palpable in rectal vault
- Hymenal notch/cleft in the posterior (inferior) portion of the hymenal rim
- Condyloma acuminata in a child older than 2 years of age
- Acute abrasions, lacerations, or bruising of labia, peri-hymenal tissues, or perineum
- Scar or fresh laceration of the posterior fourchette
- Peri-anal scar

CLASS IV: CLEAR EVIDENCE OF TRAUMA (CLEAR EVIDENCE OF ABUSE IF CREDIBLE HISTORY OF ANOGENITAL TRAUMA IS LACKING)

- Laceration of the hymen, acute
- Ecchymosis of the hymen
- Peri-anal lacerations extending deep to the external anal sphincter
- Hymenal transection (healed)
- Absence of hymenal tissue

Adapted from: Adams JA. Evolution of a classification scale: Medical evaluation of suspected child sexual abuse. *Child Mal-treatment*, in press.

appropriate. Carefully document the child's history. Record both the questions asked to the child and quotations from the child when possible. The importance of the history in establishing the diagnosis of sexual abuse cannot be underestimated, as the majority of sexually abused children have a normal physical examination, and the diagnosis rests on the child's verbal account.⁵³

The Physical Examination. The physical examination can result in further emotional trauma to the child if not done with care. Post-pubertal girls require a speculum examination, but most prepubertal children only need a careful inspection of the external genitalia. Knowledge of basic anatomy and physiology is needed to interpret physical examination findings. Physician interpretation of genital findings often differ, even among those experienced examining sexually abused children.⁵⁴ There is a wide range of normal appearance to the vulva, which changes over childhood with hormonal influence. Examination of young girls is best done in the frog-legged position. Knee-chest position is used to better define the posterior rim of the hymen, and aids in vaginal inspection. Firm labial traction will provide the best view of the vulvar structures and hymen. A colposcope provides light, magnification, and the ability to photograph or videotape the examination, but is not required.

The examination of most sexually abused children is normal.^{53,55} Many sexually abusive acts do not injure the child physically, even if the child describes "penetrating" acts. Young children do not distinguish between vulvar and vaginal, or gluteal and anal penetration. Vulvar or gluteal coitus is unlikely to leave visible injury. Because disclosure is often delayed, minor injury has often healed prior to the medical examination.⁵³ The rapid healing of sexual injury in children is well documented.^{56,57} There are few physical findings that are diagnostic of sexual abuse, and some children will have nonspecific genital changes that may be difficult to interpret.⁵⁵ Physicians who are most experienced in evaluating sexually abused children have been shown to have the most accurate diagnostic skills.⁵⁴ In an attempt to standardize the interpretation of examinations, researchers have recently proposed classification systems for interpreting genital findings.⁵⁸ Although these classifications have not been formally validated, they provide useful guidelines for practicing physicians. (See Table 2.)

Certain findings are considered pathognomonic of sexual abuse. These include the presence of semen or sperm on a non-sexually active child, unexplained acute genital or anal injuries, and gonorrhea or syphilis not transmitted perinatally.⁵⁹ Complete or near complete hymenal transections or complete loss of the posterior rim of the hymen are highly suggestive of penetrating trauma. Care should be taken when interpreting physical examination findings, as many nonspecific abnormalities can be mistaken for sexually related trauma.⁶⁰

Accidental genital injury, either from blunt or penetrating trauma, is not uncommon, but is usually distinguished from sexual abuse by the accompanying history. Impalement or other penetrating trauma can leave minimal external injury, and careful internal inspection, under anesthesia, may be required.⁶¹ Examination under anesthesia also is required for prepubertal girls with brisk, unexplained vaginal bleeding.

Consider the possibility of sexual abuse when evaluating chil-

Table 3. Likelihood of Sexual Abuse by STD

STD CONFIRMED	LIKELIHOOD OF SEXUAL ABUSE	SUGGESTED ACTION
Gonorrhea	Diagnostic*	Report
Syphilis	Diagnostic*	Report
HIV	Probable**	Report
Chlamydia	< 1-3 years of age: Possible ^α	Report
	> 3 years of age: Probable	Report
<i>Trichomonas vaginalis</i>	< 1 year of age: Possible ^α	Consider Report
	> 1 year of age: Probable	Report
Herpes (genital)	< 3 years of age: Possible ^β	Report ^β
	> 3 years of age: Probable	Report
Condyloma	< 3 years of age: Possible ^γ	Consider Report
Accuminata (Anogenital Warts)	> 3 years of age: Probable	Report
Bacterial Vaginosis	Nonspecific	No Report

Legend

- * If not perinatally acquired
- ** Must exclude perinatal and transfusion related transmission
- ^α Outer limits of incubation from perinatal transmission unknown
- ^β Must exclude autoinoculation (more likely HSV1) from caregiver or child. If clear evidence of autoinoculation, may opt not to report.
- ^γ Long incubation from perinatal transmission; most cases under 3 years of age likely to be from perinatal transmission; consider other risk factors from history in making decision to report.

dren with genital bleeding, rash, or discharge, but remember that they are nonspecific problems and require a broad approach to diagnosis. In most cases, a normal examination is consistent with a history of sexual abuse and does not eliminate the diagnosis from the differential.

Laboratory Evaluation of Sexual Abuse. The decision to screen for STDs in children suspected of having been sexually abused is dependent on the history of the assault, the medical history of the perpetrator (if known), and the child's symptoms. Universal screening is not recommended.⁶² Sexually transmitted diseases are identified in a minority of sexually abused children, many of whom have symptoms of infection.^{49,50} For most infections, culture remains the gold standard of diagnosis, and rapid tests are not indicated for prepubertal children.⁵⁰ Screening for STDs is recommended if the perpetrator has, or is at high risk for, a STD; the child has evidence of penetrating trauma; the child has signs or symptoms of a STD; the victim is an adolescent or sexually active patient; and/or the patient and/or parents are concerned about possible infection. The use of Enzyme immunoassays (EIA), direct fluorescent antibody (DFA) tests, DNA probes, and polymerase chain reaction (PCR) or ligase chain reaction (LCR) testing is *not* recommended (contraindicated) for the evaluation of chlamydial infections in prepubertal children at this time, as these methods are not approved by the Food and Drug Administration, and have not been fully evaluated in the pediatric population. Culture remains the gold standard.

Clinical indications for HIV screening include: presence of another STD; perpetrator is homosexual or an IV drug abuser; per-

petrator is unknown; multiple perpetrators; symptoms of possible HIV infection; or parental request.

The specificity of sexually transmitted infections for sexual abuse varies by the age of the patient and the specific organism. Referral for investigation is mandatory for children with some, but not all STDs. (See Table 3.) When diagnosed, sexually transmitted diseases should be treated with the appropriate medications.⁵¹ Prophylactic antibiotic use is recommended for all adolescents. (See Table 4). Prophylactic antibiotic use is not recommended for prepubertal children, but should be considered for children who have been acutely assaulted by a stranger.⁵¹ Hepatitis B immunization is recommended for all patients who have not previously been immunized. HIV prophylaxis for sexually abused children has not been studied to date. Prophylaxis is recommended by some clinicians for children who have had high-risk episodes of sexual assault and possible HIV exposure.⁶³ Consider the HIV status of the perpetrator, the type of assault, the time elapsed since the contact, and the regimen's toxicity when deciding on post-exposure prophylaxis. Consultation with an HIV specialist is recommended.

Forensic Evidence Collection. Because children do not typically present for medical evaluation

immediately after sexual assault, forensic evidence is not routinely collected during the medical evaluation. The American Academy of Pediatrics recommends forensic evidence collection when sexual abuse has occurred within the past 72 hours or if there is bleeding or injury.⁶² Recent evidence suggests that these recommendations, adapted from guidelines for adult rape victims, might not be best suited for children.⁶⁴ In a study of 273 prepubertal children who had rape kits collected and processed, semen, sperm, or blood was never recovered from the victim's body more than 13 hours after an assault. The majority of evidence was recovered from the child's clothing or bed linens, which were collected in only 35% of cases. Pending future study, swabbing the genital, anal, and oral cavities for forensic evidence should be done when:

- The assault has occurred within the past 24 hours;
- There is acute genital injury or bleeding;
- The child reports a history of ejaculation; and
- Possible evidence is identified during the examination.

Attempts should be made to collect the clothing the child was wearing at the time of the last assault. The police can collect clothing or bed linens from the child's home. Clothing should be placed in paper, not plastic, bags. All items collected must be labeled, and chain of evidence must be maintained.

Management of Child Abuse

All physicians are mandated reporters of suspected child abuse and neglect. Laws intended to identify and protect maltreated children are specifically written to encourage early reporting. The

decision to report does not require certainty that the child was abused. Physicians who report in good faith are protected from liability if the abuse is not confirmed, but failing to report abuse can result in both criminal and, more commonly, civil penalties.

Both civil and criminal laws govern society's response to child abuse. Civil child protective services laws are written to investigate child abuse and neglect perpetrated by a parent or other caregiver that is responsible for the child's care. Reports made to child welfare agencies are investigated by county or state social workers. Every state has a mechanism for reporting suspected abuse, and a hospital or practice protocol should be developed for managing such cases.

Child welfare agencies carry the responsibility of investigating the allegations of abuse, ensuring the child's safety, and providing services to improve the functioning of the family. When a child is thought to be at significant risk at home, an alternative placement is sought with a relative or foster home. Children are placed out of home in a minority of cases. More commonly, services are provided to the child and family in the home setting.

All cases of sexual abuse, and many cases of physical abuse also are reported to law enforcement. Criminal codes in each state define crimes against individuals, including children. Police investigation can result in the arrest and criminal prosecution of a perpetrator of abuse or neglect.

The need to report should always be discussed with the family. This can be an emotionally difficult task, but is needed to maintain trust and honesty with the family. The focus of the conversation should always be the welfare and well being of the child. Do not apportion blame or interrogate the family. Inform the parents of the plans for both medical treatment and investigation. If follow-up is needed, make the appropriate arrangements.

Careful documentation is mandatory in cases of suspected abuse. Physician testimony is occasionally needed for both civil and criminal hearings many months after the medical visit. Thorough documentation at the time of the medical evaluation may obviate the need for a personal appearance in the courtroom. If your testimony is required, a well-documented record is invaluable in recalling details long since forgotten.

Conclusion

Identifying children who are victims of abuse can be both heartbreaking and rewarding. Don't forget to keep child abuse on the differential diagnosis of all childhood injuries. Although emotionally difficult and time consuming, reporting your suspicion for further investigation can be the first step in saving or improving a child's life.

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Table 4. Prophylaxis after Sexual Victimization of Adolescents

***Negative pregnancy test must be documented before treatment.**

FOR GONORRHEA:

Cefixime 400 mg orally in a single dose
OR
Ceftriaxone 125 mg IM in a single dose
OR
Ciprofloxacin 500 mg orally in a single dose
OR
Ofloxacin 400 mg orally in a single dose

FOR C. TRACHOMATIS:

Azithromycin 1 g orally in a single dose
OR
Doxycycline 100 mg orally BID for 7 days

FOR TRICHOMONIASIS AND BACTERIAL VAGINOSIS:

Metronidazole 2 g orally in a single dose

FOR HEPATITIS B VIRUS:

Hepatitis B immunization, if not previously done

FOR HIV:

Consider offering prophylaxis

EMERGENCY CONTRACEPTION:

Oral contraceptive pills containing 50 mcg of ethinyl estradiol:
2 pills orally at once, then 2 pills orally 12 hours later
OR
Oral contraceptive pills containing 30 mcg of ethinyl estradiol:
4 pills orally at once, then 4 pills orally 12 hours later
PLUS
An antiemetic

Adapted from: American Academy of Pediatrics, Committee on Infectious Diseases. Sexually transmitted diseases. In: *Report of the Committee on Infectious Diseases, 2000*. 25th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2000;143-147.

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Physician CME Questions

To earn CME credit for this issue of Trauma Reports, please refer to the enclosed Scantron form for directions on taking the test and submitting your answers.

1. In the evaluation of an injured child, which of the following is correct?
 - A. Bruises are common in young infants and should *not* be considered suspicious of abuse.
 - B. The appearance of a bruise is a good indicator of its age and can be used to date an injury.
 - C. Accidental immersion burns are distinguished from inflicted immersion burns by their distinct burn margins.
 - D. Severe intra-abdominal injuries are usually recognized by bruising on the abdominal wall.
 - E. A skeletal survey is indicated for all infants who are suspected victims of physical abuse.
2. Which of the following statements about imaging studies used in child abuse evaluations is correct?
 - A. Radionuclide bone scans are more sensitive than skeletal survey in detecting acute rib fractures and should be the first imaging study used to evaluate the abused infant.
 - B. Ultrasound is not helpful in identifying intra-abdominal and intracranial injuries in the severely ill, acutely injured child.
 - C. MRI is used only occasionally in the evaluation of the abused child.
 - D. A negative skeletal survey removes the possibility of child abuse from the differential diagnosis of an injured child.
 - E. Previously unrecognized healing injuries can be detected by repeating a skeletal survey 3-4 weeks after the initial survey.
3. A 5-year-old girl is referred to you for evaluation of intermittent vaginal bleeding over the past three weeks. Which of the following is correct?
 - A. If an external genital injury is not identified, an immediate exam under anesthesia is warranted.
 - B. Bacterial vaginitis and vaginal foreign bodies can both present with vaginal bleeding.
 - C. Unexplained vaginal bleeding in a prepubertal child is highly suggestive of sexual abuse.
 - D. Forensic evidence collection is indicated.
4. Which of the following is most suggestive of sexual abuse?
 - A. A 1-year-old girl with vaginal *C. trachomatis* infection
 - B. A 2-year-old with newly diagnosed condyloma acuminata
 - C. An 8-year-old girl with *Trichomonas vaginalis*
 - D. A 3-year-old boy with penile gonorrhea
 - E. A 2-year-old girl with genital herpes infection
5. Which of the following management strategies is correct?
 - A. Photography is the best method of documenting cutaneous injuries, and can replace a written description of the findings.
 - B. Physicians are mandated to report known child abuse, and should make a report only when the diagnosis is clear.
 - C. If a child has been sexually abused by her stepfather, both child protective services and the police should be notified for investigation of the abuse.
 - D. Notifying the parents of a child abuse report is *not* recommended, because the parents might become angry and threaten the medical staff.
 - E. Most abused children are placed in foster care at the time of diagnosis, and parents should be told of this likelihood.
6. Which of the following would be most suspicious for inflicted head injury?
 - A. A 9-month-old who reportedly fell off a chair and sustained a life-threatening epidural hemorrhage
 - B. A 2-month-old who fell off the couch and sustained an isolated, linear parietal skull fracture
 - C. A lethargic, irritable 3-month-old baby with a small, parietal subdural hemorrhage and a negative skeletal survey
 - D. A 13-month-old with a forehead bruise that cannot be explained by his mother
7. Which of the following is true about the differential diagnosis of child abuse?
 - A. The diagnosis of osteogenesis imperfecta is best made by physical examination.
 - B. Rickets and other metabolic bone diseases commonly cause bilateral, posterior rib fractures.
 - C. A toddler with patterned bruises and two unexplained healing fractures warrants a coagulopathy evaluation.
 - D. Vaginal discharge in a prepubertal girl is *not* specific for sexual abuse, and a broad differential should be considered.
 - E. All sexually transmitted diseases in young children are the result of sexual abuse and should be referred for investigation.
8. Which of the following is correct?
 - A. Unsuspecting physicians miss abusive head trauma in approximately 50% of cases.
 - B. Children with physical complaints related to the genitals, but without behavioral problems or a history of sexual abuse, are unlikely to be victims of sexual abuse.
 - C. Leading questions are sometimes appropriate when interviewing children about possible sexual abuse.
 - D. The majority of sexually abused children have genital injuries that are identified by physical examination.
 - E. Universal screening of prepubertal sexual assault victims for STDs is recommended by the American Academy of Pediatrics.

In Future Issues:

**Use of Rapid
Sequence Intubation
in Trauma Patients**