Sexual abuse and sexually transmitted infections in children and adolescents

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Purpose of review

Sexual abuse is unfortunately common in the United States. The presence of a sexually transmitted infection in a child or adolescent should prompt an evaluation to exclude sexual abuse.

Recent findings

The present article reviews the demographics of sexual abuse, the prevalence of specific sexually transmitted infections, such as *Neisseria gonorrhoeae*, *Chlamydia trachomatis*, HIV, human papillomavirus (HPV) and herpes simplex virus (HSV) and which children and adolescents are at highest risk for contracting such infections. The use of nonculture methods, such as nucleic acid amplification tests (NAATs), to evaluate prepubertal children for *N. gonorrhoeae* or *C. trachomatis*, and the use of HIV postexposure prophylaxis are discussed.

Summary

Any child or adolescent with a sexually transmitted infection should be evaluated for sexual abuse. Specific infections in prepubertal children, such as *Neisseria gonorrhoeae* or *Chlamydia trachomatis*, are due to abusive contact and should be reported to Child Protective Services. As the modes of transmission of anogenital infections with HPV and HSV are unclear, an evaluation for sexual abuse should be done. Although transmission of HIV after sexual abuse is rare, HIV postexposure prophylaxis must be administered in a timely fashion, and adequate outpatient support provided to facilitate compliance and follow-up.

Keywords

HIV postexposure prophylaxis, nucleic acid amplification tests, sexual abuse, sexually transmitted infections

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Introduction

Sexual abuse of children and adolescents is unfortunately common in the United States. The presence of a sexually transmitted infection (STI) in a child or adolescent should prompt an evaluation to exclude sexual abuse. The prevalence of STIs in pediatric victims of sexual abuse depends on the type of abusive exposure, genital symptoms, prior consensual sexual activity in adolescents, and the regional prevalence of STIs in the adults. However, not all STIs may signify transmission from abusive contact, such as cases of genital infection with human papillomavirus (HPV) and herpes simplex virus (HSV).

Definitions and demographics

The Child Abuse Prevention and Treatment Act (CAPTA) defines child abuse or neglect as any act or failure to act that results in imminent risk of death, physical, or emotional harm, sexual abuse, or exploitation of a child under the age of 18 years by a parent or caretaker responsible for the child's welfare [1]. According to CAPTA, sexual abuse can be defined as the persuasion, inducement, enticement, or coercion of any child to engage in, or assist any other person to engage in, sexually explicit conduct or any simulation of such conduct for the purpose of producing any visual depiction of such conduct [1]. Some episodes of sexual abuse can meet the definition for first-degree sexual assault, or rape, in which there is oral, vaginal, or anal penetration with any part of the perpetrator's body or by an object.

In 2007, approximately 794 000 children were abused or neglected in the United States [2]. Of these substantiated cases, sexual abuse accounted for 7.6%. More than half of victims were girls (51.5%). Forty-six percent of victims were whites, 21.7% were African–American, and 20.8% were Hispanic. Eighty-one percent were between 4 and 15 years of age [2]. However, these are substantiated cases, and the rates of sexual abuse among children are likely higher. Finkelhor [3] conducted a national survey of more than 2000 families of children 2–17 years of age,

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and found that sexual victimization rates were approximately 82 per 1000 children.

Federally mandated reporting laws require that cases of suspected sexual abuse be reported to Child Protection Services [1,4]. All 50 states have passed a mandatory child abuse and neglect reporting law. All healthcare professionals in the United States are mandated reporters. The failure of a mandated reporter to report cases of abuse when one has a reasonable suspicion can result in criminal prosecution.

Medical evaluation

In most cases of sexual abuse, the diagnosis is based on the child's statements, as rarely are there any physical residua from the abuse [5,6•,7]. The following clinical conditions can also be used to confirm the medical diagnosis of sexual abuse:

(1) Sexually reactive behaviors
(2) Presence of penetrating genital trauma without prior history of unintentional genital trauma
(3) Presence of seminal products or pregnancy in a child
(4) Presence of STIs beyond the incubation period of vertical transmission (*Neisseria gonorrhoeae*, *Chlamydia trachomatis*, *Treponema pallidum*)

Sexual abuse and sexually transmitted infections

STIs, such as *N. gonorrhoeae* and *C. trachomatis*, are rare in prepubertal children with sexual abuse. Prevalence rates for *N. gonorrhoeae* and *C. trachomatis* are from 0.7 to 3.7% in this population [8–12]. The majority of children with such infections will have genital complaints and most often are girls [9–13]. Adolescent females with sexual abuse have much higher rates of *N. gonorrhoeae* and *C. trachomatis*, up to 14% in some studies [8,9]. Whereas most of these adolescents have a prior history of consensual peer sexual activity, this prevalence is somewhat higher than in a nonabused adolescent population [14].

Several authors have evaluated which patients are at higher risk of having *N. gonorrhoeae* and *C. trachomatis* after sexual abuse. Shapiro [8] found that sexually abused girls younger than 12 years of age with either *N. gonorrhoeae* or *C. trachomatis* were more likely to have vaginal discharge. Siegel *et al.* [9] found that prepubertal females with *N. gonorrhoeae* had vaginal discharge and those with *C. trachomatis* had abnormal genital examinations. For pubertal females, those with *N. gonorrhoeae* most often had vaginal discharge, but asymptomatic infections with *C. trachomatis* were common. It is useful to note that, in this study, pubertal females, especially those with *C. trachomatis*, also had histories of consensual sexual activity with peers. Ingram [13] found that, in a pediatric population who were evaluated for sexual abuse, those who had either *N. gonorrhoeae* or *C. trachomatis* were those with a history of genital-to-genital contact, had an abnormal genital examination and/or genital discharge, or had contact with a perpetrator with an STI. Thus, patients with such clinical characteristics should be evaluated for *N. gonorrhoeae* and *C. trachomatis*.

Nonculture methods to detect *Neisseria gonorrhoeae* and *Chlamydia trachomatis*

The use of nucleic acid amplification tests (NAATs) to detect *N. gonorrhoeae* and *C. trachomatis* in children with sexual abuse is somewhat controversial. The Centers for Disease Control and Prevention advocates evaluating children and adolescents with sexual abuse for *N. gonorrhoeae* and *C. trachomatis* by culture methods only. If NAATs are used, any positive tests should be confirmed by a second NAAT that targets a different genomic sequence from that used in the first test [15].

The use of NAATs in children and adolescents with sexual abuse has not been extensively studied. Matthews-Greer *et al.* [16] evaluated the use of NAATs in children with a history of sexual abuse for the detection of *C. trachomatis*. They evaluated 290 children with a mean age of 8.6 years (range 1–17 years) and obtained vaginal, oral, and rectal swabs for culture, enzyme immunoassay (EIA) and PCR for *C. trachomatis*. Of the cohort, 9% were positive by culture, PCR (two consecutive tests) or both. Culture had a sensitivity of 87% and specificity of 100%. PCR had a sensitivity of 87% and specificity of 98%. EIA had a sensitivity of only 46% and a specificity (with blocking antibody) of 100%. These authors surmised that, in children and adolescents with sexual abuse, PCR and culture for *C. trachomatis* were equivalent.

Kellogg *et al.* [17] evaluated the possibility that NAATs could supplant culture for *N. gonorrhoeae* and *C. trachomatis*. They evaluated the use of ligase-chain reaction (LCR), PCR, and culture for *N. gonorrhoeae* and *C. trachomatis* by obtaining urine and vaginal samples in 122 children and adolescents (age range 3–20 years) evaluated for sexual abuse. In this population, the prevalence of *N. gonorrhoeae* was 3% and of *C. trachomatis* was 11%. Agreement for the detection of *C. trachomatis* was 84% between vaginal PCR/urine PCR and 14% between vaginal PCR/culture. For *N. gonorrhoeae*, agreement was 66% between vaginal PCR/culture. These authors concluded that urine PCR can be substituted for vaginal PCR for the detection of *C. trachomatis* in children and adolescents evaluated for sexual abuse.

There are positive and negative implications of using NAATs in prepubertal children with sexual abuse.

The benefits are that less biological sample is required, the specimen is less susceptible to environmental changes, and it can be obtained in a less invasive manner by using urine specimens [18]. Due to its higher sensitivity than culture, it is possible that more asymptomatic infections from *C. trachomatis* could be detected [18]. The negative implications of using NAATs in prepubertal children have been well described by Hammerschlag [19–23]. With NAATs, a sensitivity of 97%, a specificity of 99%, and a prevalence of 2% in the prepubertal population would result in a positive predictive value (PPV) of only 66% [19]. False positive NAATs in prepubertal children could erroneously lead to the diagnosis of sexual abuse, which would have significant social implications for families [20,21]. Hammerschlag surmised that the increased use of NAATs in the prepubertal population may be due to extrapolation of results from populations with higher prevalence (adults, adolescents) to lower prevalence (sexually abused prepubertal children), and from studies where the age range of children and adolescents with sexual abuse was wide [21,22]. In addition, if both culture and NAATs had discordant results, this could undermine testimony accounting for sexual abuse in court.

Human papillomavirus

The most common HPV subtypes to cause anogenital infection are 6, 11, 16, and 18. The methods whereby children acquire anogenital HPV infections are unclear, with sexual abuse being the most worrisome form of transmission.

Recent literature suggests that vertical transmission (mother–child) of these genotypes may be relatively uncommon. Marais *et al.* [23] evaluated the likelihood of vertical maternal–child transmission by measuring serum antibodies to the virus. The prevalence of HPV-16 and HPV-18 antibodies was higher in children of seropositive mothers compared with seronegative mothers, but these differences were not statistically significant. Castellsague *et al.* [24] evaluated the prevalence of vertical transmission in pregnant women with and without cervical HPV. At 418 infant visits over a mean follow-up time of 14 months, 19.7% infants born to HPV-positive mothers and 16.9% of those born to HPV-negative mothers tested HPV-positive at some point during infants' follow-up. Thus, vertical transmission may not be the sole source of HPV infections in infants, and there may be horizontal mother–child HPV transmission during childhood.

There is evidence to support horizontal transmission of HPV later in childhood. Dunne *et al.* [25] evaluated the prevalence of antibodies to HPV type 16 in a sample of children 6–11 years of age. Overall, 2.4% of 1316 children 6–11 years of age were seropositive. Seroprevalence was higher in boys than girls (3.5 versus 1.2%), and in children younger than 7 years of age than in children 7 years of age (3.3 versus 0.4%). None of the variables tested for, including race/ethnicity, socioeconomic status, and urban or rural residence, were significantly associated with HPV-16 seropositivity. Although these authors did not assess the risk of sexual abuse to account for the prevalence of HPV, they concluded that, to explain HPV-16 seropositivity in this population, further study would be needed.

Several authors have evaluated the mode of transmission when children present with clinical HPV infection. Marcoux *et al.* [26] evaluated the mode of transmission in 72 children younger than 12 years of age with anogenital warts. The onset of anogenital warts occurred before age 2 years in 28% and between 2 and 6 years of age in 62% children in this study. The authors concluded that the modes of transmission of anogenital warts in children cannot be identified either by the clinical appearance of the lesions or by HPV typing, and the best way to identify possible sexual abuse as the mode of HPV transmission is by the history, family assessment, and physical examination.

Sinclair *et al.* [27] evaluated when the appearance of anogenital HPV infection was more likely associated with sexual abuse. Of the 55 children in this study with anogenital warts, 31% provided a history of sexual abuse. The risk of sexual abuse increased with the child's age, with the odds ratio for sexual abuse being 12.1 for children older than 8 years of age. There were no differences between children with and without a history of sexual abuse with respect to whether or not there was a history of genital or hand warts among their parents.

HIV

The fear of HIV seroconversion after sexual abuse is a significant concern for victims and their families. Gellert *et al.* [28] evaluated the risk for HIV seroconversion among children with a history of sexual abuse. Of the 5622 children evaluated for sexual abuse in this cohort, 28 (0.4%) were HIV seropositive. The mean age of children at the time of diagnosis was 9 years and 75% provided a clear history of sexual abuse, with 50% describing genital–genital contact. Of the perpetrators, 67% were HIV seropositive, 42% were a parent, 25% were a relative, and 33% had another STI at the time of the child's evaluation. Giardet [29] found that, of 1750 children screened for HIV at the time of evaluation for sexual abuse, only one patient (0.06%) contracted HIV after the abusive contact.

Of those children with a history of sexual abuse, HIV testing and postexposure prophylaxis (PEP) should be strongly considered in those with a concurrent STI, those with mucosal injury resulting in bleeding, those in whom the perpetrator is either HIV positive or high-risk for HIV seropositivity (concurrent infection with hepatitis B or C, high-risk behaviors [intravenous drug abuse (IVDA), incarceration], those who live in an area with high regional disease prevalence in adults, those whose sexual abuse involved multiple perpetrators, and those adolescents with a history of sexual assault by an unrelated perpetrator [30,31].

The rationale for HIV PEP is that there is a window in which the viral load can be controlled by the immune system. The addition of antiretrovirals during this window would then end replication. HIV PEP should be ideally given within 72 h of the abusive exposure, with 1 h being optimal [32]. Within this time frame, the effectiveness of PEP, based on occupational studies, would be beneficial for children who have been sexually abused [33]. PEP should also only be given to patients without a suspicion of current HIV infection, and when they and their guardians clearly understand the risks and benefits of HIV PEP, agree to adhere to compliance and will engage in a follow-up program for serology [32]. However, as many cases of child and adolescent sexual abuse present long after this 72-h period, HIV PEP is not practical.

Even if a child or adolescent presents within the window after sexual abuse when PEP may be beneficial, there is no consensus as to the number or type of antiretrovirals that should comprise PEP. Some authors recommend three drugs only with exposures most likely to transmit HIV infection and to use the fixed dose of zidovudine–lamivudine as the basis for PEP, as zidovudine has been prospectively evaluated for its efficacy in PEP in the healthcare worker case–control study [34]. If three drugs are considered, it is important to consider local resistance patterns, and to consider a three nucleoside regimen containing tenofivir and thymidine analogs such as zidovudine or stavudine [35]. It is important to note that PEP efficacy after sexual exposure has never been evaluated, but recent literature documenting seroconversion after PEP in adults suggests that it may not be completely effective, as it may result from ongoing sexual or recreational exposure [36].

It has been noted that, even when pediatric patients are provided PEP, it is often not administered in a timely fashion, nor are the appropriate drugs provided in the emergency department [37]. However, Neu [38] found that, even with outpatient support teams in place to assist pediatric patients with PEP and provision of the full course of zidovudine–lamivudine during the acute evaluation in the emergency department, only 27% of their adolescent cohort took more than 90% of PEP.

One of the difficulties of PEP is compliance with successfully completing the regimen and returning for follow-up; this has been documented by several authors in adult women after sexual assault [39–41]. Schremmer [42] found that, in pediatric patients who took PEP (primarily zidovudine and lamivudine) after sexual assault, only 24% completed the full course. Olshen *et al.* [43] retrospectively evaluated PEP in adolescents within 72 h of rape. Of this cohort, 12% completed a 28-day course, and 46% had adverse reactions. They concluded that uncertainty about exposure, low follow-up rates, and psychiatric comorbidity limit adherence to PEP. Similarly, Du Mont [44•] found that uncertainty about the assault's circumstances and intolerance of side effects played a role in the low compliance (33.6%) with completing PEP in their prospective cohort, despite the provision of rigorous support by the medical team tracking these patients. They also found that those adolescents who were not enrolled in school and who were minorities would need additional outpatient support.

Herpes simplex virus

Infection with HSV in children can be a marker of sexual abuse. It can also result from nonabusive hand–genital contact, such as autoinoculation in a child with active oral lesions, or from caregivers during bathing and toileting [22]. A careful history should be obtained to exclude sexual abuse as the mode of transmission. Typing of HSV is not helpful to determine whether sexual abuse was the mode of transmission, as up to 20% of adult cases of genital herpes infection are due to type 1 [22].

Reading *et al.* [45] evaluated the likelihood that HSV in a child was due to sexual abuse by doing a structured literature search for reports of series of children presenting with genital herpes for which an assessment for possible sexual transmission or child sexual abuse had been made. Of the five studies reviewed, just over half of reported cases of genital herpes in children had evidence suggestive of a sexual mode of transmission. Sexual transmission was reported more commonly in older children (ages >5 years), in children presenting with genital lesions alone, and when type 2 HSV was isolated. However, many of the assessments for sexual abuse performed in these studies were not methodologically sound. They concluded that a larger, prospective, population-based study should be done.

There is a low prevalence of antibodies to HSV-2 in children and adolescents with a history of sexual abuse. Ramos *et al.* [46] analyzed the sera from 150 children

seen in a sexual abuse clinic for type-specific HSV-1 and HSV-2 antibodies. They found that 51% had antibodies to HSV-1 but fewer than 1% had antibodies to HSV-2. They surmised that routine screening for HSV-2 in sexually abused children does not have a high yield.

Conclusion

Any child or adolescent with a STI should be evaluated for sexual abuse. STI testing in children and adolescents should be considered based on the prevalence of disease in the adult population, the patient's age and the presence of genital symptoms. Specific infections in prepubertal children, such as *N. gonorrhoeae* or *C. trachomatis*, are due to abusive contact and should be reported to Child Protective Services. One must consider confirmatory testing if using NAATs to evaluate prepubertal children for *N. gonorrhoeae* or *C. trachomatis*. The modes of transmission of anogenital infection with HPV and HSV are unclear, but a child or adolescent with such infections should be evaluated for sexual abuse. Although transmission of HIV after sexual abuse is rare, HIV PEP in victims of sexual abuse must be administered in a timely fashion, and adequate outpatient support provided to facilitate compliance and follow-up.

References and recommended reading

Papers of particular interest, published within the annual period of review, have been highlighted as:

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Additional references related to this topic can also be found in the Current World Literature section in this issue (p. 126).

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