Sexually transmitted diseases in sexually abused girls and adolescents

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Purpose of review

The clinical evaluation for suspected child sexual abuse often includes sexually transmitted disease testing. In spite of the high prevalence of sexual abuse, however, most abused children will not have a sexually transmitted disease identified. The low prevalence of sexually transmitted diseases in this population requires special care by the clinician to exclude false-positive test results and to provide appropriate guidance to child protection workers.

Recent findings

The likelihood of sexual transmission varies for specific infectious agents and the transmission of infectious agents such as human papillomavirus is complex. Concern about the low positive predictive value of many tests for sexually transmitted diseases in this population is again being demonstrated and clinicians are asked to be cautious in interpreting test results.

Summary

Clinicians are mandated reporters of suspected child abuse. Treatment of sexually transmitted diseases may need to be delayed pending confirmatory testing of the initial results. HIV postexposure prophylaxis should be considered within hours of the exposure.

Keywords

HIV, human papilloma virus, sexual abuse, sexually transmitted disease, testing

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Abbreviations

HPV	human papillomavirus
NAAT	nucleic acid amplification test
PPV	positive predictive value
STD	sexually transmitted disease

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Introduction

When diagnosing and treating sexually transmitted diseases (STDs) in sexually abused children and adolescents, potential conflicts may arise between best medical care and legal requirements. The clinician's first priority is to provide excellent medical care for the child. By understanding the forensic issues involved, however, the clinician can usually identify a course of testing and treatment that satisfies both the medical and forensic needs of the child who has been the victim of abuse.

The accuracy of STD diagnosis is critical when testing is done to support allegations of child abuse or assault. Diagnostic errors may occur when testing prepubertal children because tests have poor positive predictive values (PPVs) in this low-prevalence population. Even among prepubertal children tested for reports of abuse, the prevalence of infection is very low and confirmatory testing may be needed. Clinicians must be mindful of the risks to the child in delaying treatment compared with the risks of making an inaccurate diagnosis.

When the diagnosis of certain STDs is suspected or made, clinicians are required to report suspected sexual abuse to the legally mandated child protection agencies. Clinicians are expected to interpret for the nonmedical professional involved in a child sexual abuse case the significance of the diagnosed STD and to provide guidance regarding if the infection was transmitted through sexual or nonsexual modes.

The present review discusses the diagnosis and management of STDs in the context of sexual abuse and sexual assault. Literature has been published in the past year on transmission of human papillomavirus (HPV) and we highlight these articles. We also review the indications for HIV prophylaxis following reported sexual assault.

Rationale for gonococcal and *Chlamydia* testing in children reported to have been sexually abused

In spite of the high prevalence of sexual abuse, estimated to be 12–25% of girls and 8–10% of boys [1], most abused children will not have any physical examination findings nor any sexually transmitted infections.

The incidence of STDs in prepubertal children is estimated to be 1–5%. Authors have suggested [2–6] limited

STD testing because of this low prevalence of infection in prepubertal abuse victims. The criteria recommended include testing if there are symptoms of an STD or examination findings that suggest penetration; perpetrator characteristics that increase risk of STD infection such as intravenous drug use, multiple partners, adolescent age, or known STD; as well as testing if the victim was assaulted by multiple perpetrators. Like the adolescent patient, the majority of STDs in prepubertal children are asymptomatic, although prepubertal girls can develop a gonococcal vaginitis that is almost always symptomatic. Most experts agree that all adolescent victims should be screened or treated because the prevalence of infection is high in this group. In spite of low disease prevalence, many physicians screen for STDs in an effort to identify and protect the abused child.

When screening for STDs in young children, a test that has a high sensitivity and low cost, is easily obtained, and has a reasonable specificity is desirable. For diagnostic purposes, a test with very high specificity is best to avoid false-positive results. Gonococcal and *Chlamydia* cultures, when appropriately obtained, stored, and tested, have excellent specificities and for this reason have been described as the only tests to be used in court cases. In fact, other tests are allowable as evidence in court but, as with culture, the court must be informed of the test's limits. The importance of using a test with high specificity cannot be underestimated. A test's PPV, which describes how often a positive test will represent a true infection, is dependent on the disease prevalence. In populations in which disease prevalence is low, the PPV will be less. When testing a prepubertal population for STDs, with an assumed disease prevalence of 2%, the PPV of a test that is 99.9% specific, such as culture, has a PPV of only 95.1%. If the disease prevalence is only 1%, the PPV of this same test is 90.5%. In this environment, caution must be exercised when diagnosing any STD. In our clinical practice we attempt to confirm all positive cultures with a repeat culture and a nucleic acid amplification test (NAAT) to avoid acting on false-positive results.

The role for NAATs in prepubertal STD testing has been and is being evaluated [7•,8–11]. Controversy continues mainly because we await more data on the use of NAATs in this group. NAATs have many advantages compared with culture. There are no difficult specimen storage requirements, a single swab can be used to test for both *Neisseria gonorrhoeae* and *Chlamydia*, and urine can be tested rather than vaginal or cervical specimens, although at a reduced sensitivity. In addition, the sensitivity of NAATs for *Chlamydia* is much greater than culture, making the NAAT an attractive screening test. Gonococcal culture is slightly more sensitive than NAATs. An excellent review, along with recommendations for *Neisseria gonorrhoeae* and *Chlamydia* screening methods, was published in 2002 by the Centers for Disease Control [12]. More studies to determine the sensitivity and specificity of NAATs in young children are needed. NAATs are not approved for rectal specimens. In the meantime, NAATs should not be considered evidence of infection unless confirmed by culture or an additional NAAT targeting a different sequence on the nucleic acid. Although they are not approved for vaginal specimens in young children, many clinicians are using vaginal NAATs for screening.

Human papillomavirus

Anogenital warts, or condyloma acuminata, usually begin as small flesh-colored flat papules. They can develop into clusters or pedunculated flesh-colored lesions. In children, the perianal region is the most common site, followed by the labia in girls and the penile shaft and the scrotum in boys. Less commonly, condyloma acuminata appear in the periurethral area or in the vestibula. The lesions are usually painless, but the lesions can become irritated with friction, break down, and cause itching or even bleed. There is no known association between confirmed cases of sexual abuse and specific HPV anogenital location.

Diagnosis is usually made by visual inspection. Although not required for forensic purposes, if the diagnosis is in question a Papanicolaou brush of the lesion can be obtained and sent for DNA testing. Painting mucosal lesions with acetic acid, a test often performed in adolescents, often causes a whitening of the lesion if it is HPV [13••]; however, this test can be painful in young children, depending on the presence of inflammation and the site of the lesion.

In adults, anogenital HPV is generally thought to be a sexually transmitted infection, but nonsexual transmission is thought to be common in young children [14•]. Sexual abuse must be considered in children with anogenital, laryngeal, and oral HPV, but nonsexual transmission must be considered as well. Vertical transmission from parents, heteroinoculation from caregivers, and autoinoculation are all possible types of nonsexual HPV transmission. There is a theoretical mode of transmission by fomites but little direct evidence of this. Vertical transmission is the generally accepted transmission mechanism of laryngeal papillomas [13••,15••], although oral sex can transmit HPV to the oral and laryngeal mucosa.

Typing for HPV is not indicated for forensic purposes. More than 200 types of HPV are known. The types that cause anogenital and respiratory mucosal infections in children are typically types 6 and 11. Cutaneous warts are caused mostly by types 1 and 2. Children may have either cutaneous or mucosal types of warts in the

anogenital region [13••], but typing is not useful for differentiating between sexual abuse and nonsexual HPV transmission to children [13••]. Sexual abuse of children includes fondling and digital penetration. A diagnosis of HPV type 1 or 2 in the child's anogenital region, therefore, does not differentiate between heteroinoculation from sexually abusive acts and heteroinoculation from a caregiver aiding in bathing or toileting, or from autoinoculation. Similarly, the presence of HPV types 6 and 11 suggests acquisition from a genital site but does not help to distinguish perinatal transmission and transmission by sexual abusive means (genital–genital or genital–anal contact).

Older children with HPV may more often be victims of abuse compared with younger children, but sexual abuse should be considered in any child with anogenital HPV [15••]. In one retrospective study of children with HPV infection [15••], children who were 4–8 years of age were 2.9 times more likely to have been sexually abused compared with children younger than 4 years of age, and children who were 8–12 years of age were 12.1 times more likely to have been abused compared with children younger than 4 years of age. Evaluation for sexual abuse begins with a detailed history that includes the age of the child when the warts were first noticed and a concurrent presence or history of nongenital warts in the child or in any family member or caretaker. Mothers should be asked about a history of visible condyloma and also about abnormal Papanicolaou results that are associated with HPV. As with other children with an STD, the history should also include behavioral or physical symptoms that can be seen in children who have been sexually abused. The child should be interviewed by a qualified forensic interview to ask about possible abuse so that a suggestive interview is avoided. The child should have a physical examination including a detailed inspection of the external genitalia, and testing for other potential sexually transmitted infections should be completed.

The incubation period for HPV infections spans from several weeks to several years. The virus has the ability to establish latent infection and it is unclear how long latent infection can persist. Studies have also demonstrated subclinical HPV infection. In one study [16], HPV DNA was detected from perineum swabs and vaginal lavage samples in five prepubertal patients. None of these patients had visual evidence of genital warts or colposcopic evidence of HPV infection on the vulva.

Sometimes it is not be possible to determine the mode of HPV transmission or whether the child has been sexually abused. Factors that contribute to the difficulty in this determination include the long incubation period between acquisition of HPV and the development of warts, an unknown incubation period upper limit, the subtle presentation of lesions, and the tendency of lesions to spontaneously remit.

Perinatal transmission of HPV has recently been studied. A Finnish study [17•] that looked at the transmission rate of HPV between parents and their infants showed that the most common profile was for the mother, father, and infant to all be positive for HPV (29% of families). There were also HPV positive father–infant pairs (10.5% of families), however, and in 8% of families in the study only the infant was positive. The authors conclude that the mechanisms of transmission of HPV to infants are complex. An earlier study to evaluate concordance in HPV type between parents and newborns [18] found a rate of concordance of vertical transmission of HPV of less than 1%.

Postexposure prophylaxis for HIV

Sexual abuse of children and adolescents carries the risk of transmission of sexually transmitted infections including HIV. In many cases if the patient presents for evaluation within 72 hours of an assault event, prophylaxis for *Chlamydia*, gonorrheal, and *Trichomonas* infection will be offered. Although no studies have evaluated the efficacy of postexposure administration of antiretroviral drugs for the prevention of HIV in nonoccupational exposures, it is still recommended in certain situations following sexual abuse or assault in children and adolescents.

The risk of HIV transmission in cases of sexual abuse is related to the probability that the perpetrator is infected with HIV. The risk also depends on the amount of infectious material that is transmitted and the type of contact between the exposure source and the susceptible person [19]. Blood and fluid contaminated with blood from a person with HIV infection are associated with the highest risk of transmission of the virus. Semen and vaginal secretions may also contain HIV and should be considered infectious, but exposure to these may carry a lower risk of HIV transmission [20]. The risk of transmission of HIV from a single event of unprotected receptive vaginal intercourse when the perpetrator is infected with HIV is 0.0001–0.003 and the risk of unprotected receptive anal intercourse is 0.005–0.032 [19]. The presence of genital or anal tissue injury in the susceptible individual increases the risk of transmission, however. Transmission of HIV infection from human-to-human bites has been reported, but transmission in this manner is thought to be extremely rare [19]. If there is blood present in the bite wound, the risk of transmission may go up.

Postexposure prophylaxis for HIV infection with antiretroviral medications is thought to slow or eliminate HIV replication in the period just after exposure when the

viral load is small enough. HIV postexposure prophylaxis should be initiated as soon as possible after the potential exposure and no later than 72 hours after the exposure. The regimen is continued for 28 days. When evaluating a person who has had a potential exposure to HIV and, therefore, may need postexposure prophylaxis, considerations include duration of time that has passed since the potential exposure; likelihood that the perpetrator is exposed to HIV; type of exposure; potential side effects from the therapy; and the patient's adherence to the therapy regimen. The choice of antiretroviral medicine regimens and the drugs' toxicities are beyond the scope of this review. Current recommendations for HIV postexposure prophylaxis are available on the Centers for Disease Control's Web site. If HIV postexposure prophylaxis is initiated, physicians with experience with HIV infections in children should be consulted. The decision to begin HIV postexposure prophylaxis should be made also in collaboration with the exposed person or the family. Studies have demonstrated that the compliance and follow-up of pediatric patients given HIV postexposure prophylaxis are poor. In one study [21•], only 24% of patients finished the entire course of prophylaxis and only 50% attended at least one follow-up visit. In another study [22•], almost 40% of the patients did not present for follow-up HIV testing.

Testing for HIV antibody in the exposed person is recommended at baseline and at 6 weeks, 12 weeks, and 6 months after exposure. If HIV postexposure prophylaxis is given, patients also need close follow-up to assess compliance and psychological stress and to monitor side effects from the medications. The initial follow-up should be 2–3 days from starting the medication.

Sexually transmitted diseases and sexual abuse: does infection always mean abuse?

Sexual abuse must always be considered when an STD is diagnosed in a prepubertal child. The likelihood of sexual transmission, and therefore sexual abuse, is greater for certain STDs than others. Although the diagnosis of *N. gonorrhoeae*, *Chlamydia trachomatis*, syphilis, or HIV will almost always require a report to the legally mandated agencies for suspected child abuse, perinatal and rare nonsexual transmission must also be considered. Nonsexual transmission beyond the neonatal period is rare for these organisms, and the majority of experts consider sexual abuse to be all but certain after a careful history and examination are completed to exclude perinatal and rare nonsexual transmission. The rate of nonsexual transmission of HPV is most likely greater than the rates of nonsexual transmission for these other organisms.

The American Academy of Pediatrics [23••] issued a 2005 revision of the Committee on Child Abuse and Neglect report on 'The evaluation of sexual abuse in children' summarizing the implications of various STDs in children, and recent reviews were published in the October 2005 *Seminars in Pediatric Infectious Diseases* [13••,24, 25•,26–28] covering the epidemiology, microbiology, pathogenesis, and childhood infections with gonorrhea, *Chlamydia*, syphilis, herpes simplex virus, HPV, and hepatitis B and C viruses.

Neisseria gonorrhoeae is the most common STD reported by many child abuse centers in prepubertal children, and few reports of nonsexual transmission have been published. An interesting short letter from Dayan [29] describes a case of alleged vaginal gonococcal infection in an 8-year-old girl from an airline toilet seat. Although sexual abuse in any child is very difficult to exclude, this report provides a convincing analysis of the unlikely occurrence of sexual abuse in this 8-year-old girl and the probable nonsexual transmission. This is one of the first reports of nonsexual transmission of *N. gonorrhoeae* and is a reminder that although we should assume that most prepubertal children who are infected with *N. gonorrhoeae* beyond the neonatal period have had close intimate sexual contact with an infected person, nonsexual transmission may occasionally occur.

The rate of *Chlamydia* infection among women of childbearing age is between 2% and 12% and most of these infections are asymptomatic. The risk to the newborn of acquiring the infection at the time of birth may be as high as 70%. Infection may include vaginal, rectal, or pharyngeal sites and, unlike *N. gonorrhoeae*, urethral or vaginal *C. trachomatis* infection is frequently asymptomatic in the prepubertal child. Asymptomatic vertical transmission has been documented to persist for at least 3 years [30]. These factors make it more difficult to exclude nonsexual transmission in the younger prepubertal child. After considering this possible route of infection, nonsexual transmission is believed to be rare. A review of the maternal health records and determination of prior antibiotic therapy administered to the infected child can help the clinician sort out this dilemma.

The viability of *Trichomonas* organisms to survive on towels and in bath water has been debated. It appears that spread by fomites, although highly unlikely, is possible [31].

In the sexually active adolescent, sexual transmission is far more common than nonsexual transmission for all of these organisms and differentiating between sexual and nonsexual transmission is typically not required for legal purposes. Even when there is a history of sexual assault, the identification of an STD does not provide evidence of infection from the assault. Many institutions have different protocols, therefore, for STD testing and treatment of prepubertal and postpubertal victims of assault. STD

testing is not required for adolescents if presumptive treatment is going to be offered. In contrast, testing, when offered, should rarely be followed by presumptive treatment in the prepubertal child, and follow-up confirmatory testing will probably be required if initial tests are positive.

Child abuse reporting

Clinicians must make reasonable efforts to exclude nonsexual transmission and to explain the likely transmission as well as the level of certainty of sexual transmission to child protection workers. Given that nonsexual transmission may never be able to be excluded completely, the clinician must provide sound advice to child protection workers. After completing a work-up to exclude perinatal transmission or other expected nonsexual methods of transmission, and given the high prevalence of sexual abuse and the rarity of nonsexual transmission of *N. gonorrhoeae*, *Chlamydia*, syphilis, HIV, and *Trichomonas* infections, the clinician should advise child protection agencies that the most reasonable explanation for the infection is intimate sexual contact. When HPV or herpes simplex virus is diagnosed in a young child, nonsexual transmission is very difficult to exclude. Experts debate if all children with these infections should be reported to child protection agencies. An evaluation for sexual abuse, including an evaluation for sexual abuse, including a well executed forensic interview by a trained interviewer, a physical examination, and testing for other STDs should be completed whenever any STD is diagnosed in a prepubertal child.

Conclusion

The diagnosis of STDs in sexually inactive children and youth requires careful attention to diagnostic accuracy by the clinician because routine testing practices are inadequate in this population. The practitioner must be mindful of the legal, forensic, and child protection issues that are intimately entangled with STD identification in this population.

References and recommended reading

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

- • of special interest
- •• of outstanding interest

Additional references related to this topic can also be found in the Current World Literature section in this issue (p. 576).

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