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Reports of Repetitive Penile-Genital Penetration Often Have No Definitive Evidence of Penetration

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Pediatrics 2009;124;e403-e409; originally published online Aug 3, 2009;
DOI: 10.1542/peds.2008-3053

Reports of Repetitive Penile-Genital Penetration Often Have No Definitive Evidence of Penetration

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KEY WORDS
child sexual abuse, rape

ABBREVIATIONS
CAC— children's advocacy center
OR— odds ratio
CI— confidence interval

www.pediatrics.org/cgi/doi/10.1542/peds.2008-3053

doi:10.1542/peds.2008-3053

Accepted for publication Apr 16, 2009

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PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

FINANCIAL DISCLOSURE: *The authors have indicated they have no financial relationships relevant to this article to disclose.*

WHAT'S KNOWN ON THIS SUBJECT: Most anogenital examinations of child sexual abuse victims reveal no definitive evidence of abuse; however, individuals involved in abuse cases may assume an association between an increasing number of reported genital penetrations and the presence of definitive findings of penetration.

WHAT THIS STUDY ADDS: Most child sexual abuse victims who report repetitive penile-genital contact that involves some degree of perceived penetration have no definitive evidence of penetration on examination of the hymen.

abstract

OBJECTIVES: The goals were to evaluate the association of definitive hymenal findings with the number of reported episodes of penile-genital penetration, pain, bleeding, dysuria, and time since assault for girls presenting for nonacute, sexual assault examinations.

METHODS: Charts of all girls 5 to 17 of age who provided a history of nonacute, penile-genital, penetrative abuse were reviewed. Interviews and examinations occurred over a 4-year period at a children's advocacy center. Characteristics of the histories provided by the subjects were examined for associations with definitive findings of penetrative trauma.

RESULTS: Five hundred six patients were included in the study. Of the 56 children with definitive examination results, 52 had no history of consensual penile-vaginal intercourse and all were ≥10 years of age. Analysis was unable to detect an association between the number of reported penile-genital penetrative events and definitive genital findings. Eighty-seven percent of victims who provided a history of >10 penetrative events had no definitive evidence of penetration. A history of bleeding with abuse was more than twice as likely for subjects with definitive findings. Children <10 years of age were twice as likely to report >10 penetrative events, although none had definitive findings on examination.

CONCLUSIONS: Most victims who reported repetitive penile-genital contact that involved some degree of perceived penetration had no definitive evidence of penetration on examination of the hymen. Similar results were seen for victims of repetitive assaults involving perceived penetration over long periods of time, as well as victims with a history of consensual sex. *Pediatrics* 2009;124:e403–e409

Clinicians with expertise in the evaluation of sexually abused children frequently assess young girls who provide a history of repetitive penetrative abuse but have no corroborative evidence on genital examination. This scenario often occurs for children who make delayed disclosures of sexual abuse, when most forensic evidence is not present. Previous studies documented hymenal development in the absence of abuse,[1] compared genital findings for abused and nonabused children,[2] and compared sexually active and non–sexually active adolescents.[3] Although studies have established clearly that most anogenital examinations of child and adolescent sexual abuse victims reveal no definitive evidence of abuse,[2,4] some individuals involved in potential child abuse cases may assume an association between an increasing number of reported genital penetrations and the presence of definitive findings of penetration.

Researchers have attempted to identify factors that increase the likelihood of visible trauma, including the time elapsed from last abuse to examination,[5,6] the type of sexual contact (penetrative versus nonpenetrative),[4,7] and symptoms of pain and/or bleeding.[6] The associations between these factors and examination findings of penetrative trauma have been difficult to establish because of limited numbers of studies, variable characteristics of the study populations, and changes in the interpretation of anogenital findings.[8] In addition, dysuria after abuse has been associated with genital-genital contact[9] and may be predictive of visible trauma.

The purpose of this study was to evaluate the association between the number of reported episodes of penile-genital contact in which the child perceived some degree of penetration and definitive genital findings for children and adolescents. In addition, this study examined the associations of definitive findings on genital examination with dysuria after abuse, symptoms of genital pain or bleeding, and the time between examination and the last contact involving perceived penetration.

METHODS

We reviewed all charts for children presenting to a children's advocacy center (CAC) in 2004–2007. The CAC provides medical services for victims of child sexual abuse that occurred >72 hours previously. Subjects included girls who were evaluated for nonacute sexual assault, with a history of perceived penile-genital penetration provided by the patient (age: 5–17 years) and a documented number of penile-genital penetrative episodes provided by the child. Penetration was defined on the basis of the child's report that the perpetrator's penis went "inside" her genitals (or other proxy words). Patients were excluded if there was a disclosure that included genital-genital contact without penetration, an inability to quantify the number of perceived genital-genital penetrative events, cognitive abilities that limited the interview, a history of accidental trauma that caused bruising or bleeding to the genital area, or a history of speculum examination. Children with ≤10 episodes of perceived penetration provided specific absolute numbers of episodes, whereas those who disclosed >10 events were not required to provide a specific number of episodes.

A physician, a nurse practitioner, and a sexual assault nurse examiner, each with experience in ≥500 child sexual assault interviews and examinations, conducted medical evaluations at the CAC. The evaluation consisted of a detailed history and examination, including photocolposcopy. Legal guardians provided consent for the medical evaluation. The medical history was gathered from the child by the examiner without family members present. Non–English-speaking patients were interviewed in their preferred language by a clinician who was fluent in that language. Examiners had been trained to use nonleading nonsuggestive questioning and to gather information that might be important for diagnosis and treatment. After subjects made a disclosure of penile-genital penetration, examiners asked subjects the following questions. (1) "When was the last time [penetration] occurred?" (2) "How often did [penetration] occur?" If the child gave a qualitative response (eg, "a lot"), then question 3 was asked. (3) "How many times did [penetration] occur?" [Penetration] refers to the word or words the child used to describe the event involving perceived penetration. In addition, clinicians asked whether the child "ever had any problems with pain or bleeding" during or after the abuse. If the child indicated that she experienced pain, then she was asked where and whether the pain was related to urination or defecation.

Pubertal patients were questioned about consensual sexual contact, including frequency and type of contact. The total numbers of consensual and abusive penetrations were combined for patients who reported both.

All genital examinations were conducted with a colposcope with a minimum of 7.5× magnification. Supine and prone knee-chest positions were used for each examination. Tracing of the hymenal rim with a cotton-tipped applicator with the patient in the supine position was performed if findings were not demonstrated readily by using the prone knee-chest position. The CAC medical director reviewed all findings that raised concerns regarding definitive trauma, including acute lacerations and ecchymoses of the hy-

men, deep notches, and healed transections or clefts, as defined by Adams et al.[8]

Definitive findings on genital examination were defined as a healed hymenal transection (an area between 4 and 8 o'clock on the rim of the hymen that appeared to have been torn through to, or nearly to, the base of the hymen), a missing segment of hymenal tissue in the inferior half of the hymen, or acute findings.[8] Findings considered definitive for penetrative trauma were confirmed by using the swab technique or the prone knee-chest position.

Two separate photographic reviews were conducted by 3 outside reviewers, each having ≥20 years of experience in evaluating pediatric sexual abuse victims and each having performed ≥2500 sexual abuse examinations. Each review consisted of 50 single colposcopic photographs selected for their quality and presence or absence of findings. The first set of 50 photographs contained 5 photographs of hymens with healed transections, 25 normal hymens, 6 hymens with deep notches, and 14 hymens with shallow notches, as classified by the study CAC. Notches were defined on the basis of previously established criteria.[2] The second set of 50 photographs contained 25 hymens with healed transections (Fig 1) and 25 hymens with deep notches (Fig 2), as classified by the study CAC. Deep notches are considered indeterminate of penetrative trauma,[8] and differentiation between a deep notch and a healed hymenal transection may be the most important distinction for definitive evidence of penetration. All deep notches in the review were in pubertal patients, because no deep notches were found in prepubertal patients in the study. Reviewers evaluated the photographs independently, were blinded to patient history and previous interpretations of the findings, and were not aware of the numbers of healed hymenal transections in the review slides. Reviewers were asked to classify the findings as healed hymenal transection or not.

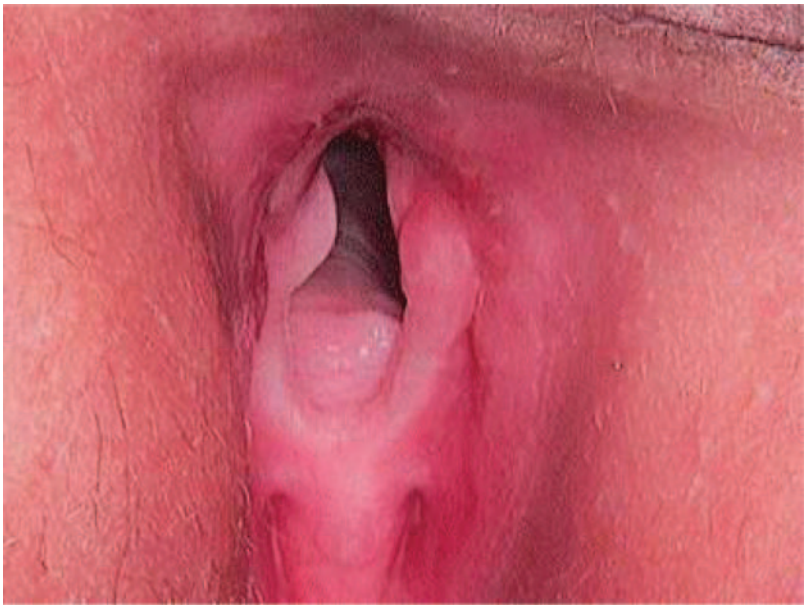

FIGURE 1
Hymenal transection, in prone knee-chest position.

Characteristics of subjects were compared by using *t* tests for continuous variables and χ^2 tests for categorical variables. Odds ratios (ORs) for definitive findings on examination were calculated for the presence of bleeding, dysuria, and genital pain, time since last reported penetrative event, and number of reported penetrative events

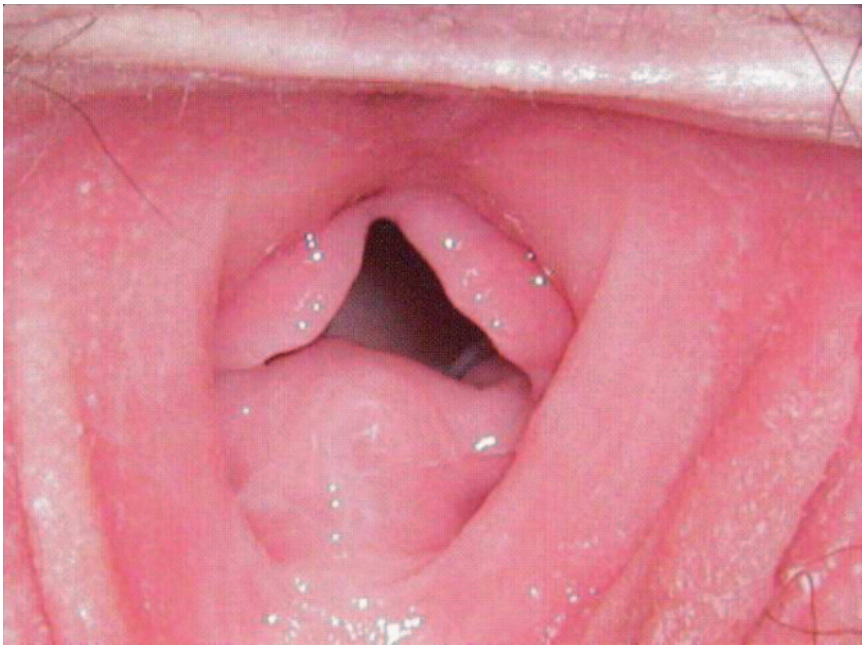

FIGURE 2
Deep notch, in prone knee-chest position.

by using logistic regression. Reviewers' evaluations of the photographs were compared with study CAC findings, and interrater reliability was evaluated with the κ statistic. All data were analyzed by using SAS 9.1 (SAS Institute, Cary, NC). The institutional review board of the University of Texas Health Science Center at San Antonio approved this study.

RESULTS

Study Group

A total of 960 charts for girls 5 to 17 years of age who reported penile-genital contact events with perceived penetration were identified. Of those subjects, 454 were unable to quantify the number of penetrative events. Charts for the remaining 506 patients were included in the study. Subjects were divided into 2 groups on the basis of their history of consensual sex. Table 1 summarizes the characteristics of the population. All of the definitive findings documented were healed hymenal transections.

Expert Review

Outside reviewers agreed with study examination findings regarding the presence of definitive findings of penetrative trauma in 99.3% of cases in the first photographic review (κ = 0.88–1) (Table 2), which indicated almost perfect agreement.[10] In the second review, which consisted only of cases of complete transections and deep notches, outside reviewers agreed with CAC findings in 80.7% of cases (κ = 0.56–0.64) (Table 3), which indicated moderate to substantial agreement.[10] In the second review, there was disagreement in 29 of 150 photographic reviews. Of those 29 disagreements, 20 involved cases in which outside reviewers diagnosed a deep notch and CAC clinicians diagnosed a healed hymenal transection.

TABLE 1 Characteristics of the Study Population

	History of Consensual Sex	No History of Consensual Sex
N	22	484
Age, y		
Mean ± SD	14.4 ± 1.3	12.4 ± 2.7
Median	14	13
Range	12–17	5–17
Dysuria, *n* (%)	5 (22.7)	93 (19.2)
Bleeding, *n* (%)	3 (13.6)	119 (24.6)
Pain, *n* (%)	12 (54.5)	272 (56.2)
Time since last penetration, *n* (%)		
3–7 d	0 (0)	8 (1.7)
8–14 d	1 (4.5)	18 (3.7)
15–30 d	8 (36.4)	123 (25.4)
1–2 mo	7 (31.8)	128 (26.4)
>2 mo	6 (27.3)	207 (42.8)
No. of penetrations, *n* (%)		
1	0 (0)	235 (48.6)
2–10	20 (90.9)	150 (31)
>10	2 (9.1)	99 (20.5)
Definitive examination findings, *n* (%)	4 (18.2)	52 (10.7)

TABLE 2 Agreement of Diagnoses Regarding Definitive Examination Findings Between CAC and Outside Reviewers

CAC Findings	Reviewer Findings, *n*		κ (95% CI)
	Transection	No Transection	
Reviewer 1			
Transection	5	0	1
No transection	0	45	
Reviewer 2			
Transection	5	0	1
No transection	0	45	
Reviewer 3			
Transection	4	1	0.88 (0.64–1)
No transection	0	45	

TABLE 3 Agreement of Diagnoses Regarding Definitive Examination Findings Between CAC and Outside Reviewers, in Cases of Deep Notches and Transections Only

CAC Findings	Reviewer Findings, *n*		κ (95% CI)
	Transection	Deep Notch	
Reviewer 1			
Transection	17	8	0.56 (0.33–0.79)
Deep notch	3	22	
Reviewer 2			
Transection	18	7	0.64 (0.43–0.85)
Deep notch	2	23	
Reviewer 3			
Transection	20	5	0.64 (0.43–0.85)
Deep notch	4	21	

Patient Characteristics and Findings

Of the 484 patients with no history of consensual sexual contact, 52 had definitive findings of penetrative trauma. All 52 were ≥10 years of age. Therefore, subjects ≥10 years of age were compared with subjects <10 years of age (Table 4). Significant differences between these groups included fre-

TABLE 4 Characteristics of Children With No History of Consensual Sex

	<10 y of Age	≥10 y of Age
N	74	410
Age, y		
Mean ± SD	7.3 ± 1.3	13.3 ± 1.7
Median	7	13
Range	5–9	10–17
Dysuria, *n* (%)	20 (27)	73 (17.8)
Bleeding, *n* (%)	9 (12.2)	110 (26.8)
Pain, *n* (%)	46 (62.2)	226 (55.1)
Time since last penetration, *n* (%)		
3–7 d	0 (0)	8 (2)
8–14 d	1 (1.4)	17 (4.1)
15–30 d	21 (28.4)	102 (24.9)
1–2 mo	15 (20.3)	113 (27.6)
>2 mo	37 (50)	170 (41.5)
No. of penetrations, *n* (%)[a]		
1	27 (36.5)	208 (50.7)
2–10	24 (32.4)	126 (30.7)
>10	23 (31.1)	76 (18.5)
Definitive examination findings, *n* (%)	0 (0)	52 (12.7)

[a] $P < .05$.

quency of bleeding, presence of definitive findings on examination, and number of episodes of perceived penile-genital penetration. Of note, children <10 years of age were twice as likely to report >10 episodes of penetration (OR: 1.98; 95% confidence interval [CI]: 1.14–3.44). Further analysis of the associations of patient characteristics with definitive findings for children ≥10 years of age with no history of consensual sex is presented in Tables 5 and 6. Bleeding was associated with definitive findings on examination for children ≥10 years of age,

TABLE 5 Association of Patient Characteristics With Definitive Examination Findings for Children ≥10 Years of Age With No History of Consensual Sex

	OR (95% CI)
Dysuria	1.28 (0.62–2.63)
Bleeding	2.47 (1.36–4.49)
Pain	1.03 (0.57–1.85)
Time since last penetration	
3–7 d	0.91 (0.11–7.77)
8–14 d	1.97 (0.59–6.55)
15–30 d	1.28 (0.65–2.53)
1–2 mo	0.42 (0.17–1.02)
>2 mo	1

TABLE 6 Relationship of Number of Reported Penetrative Events to Definitive Examination Findings for Children ≥10 Years of Age With No History of Consensual Sex

No. of Penetrations	Proportion With Definitive Examination Findings, *n*/*N* (%)	OR (95% CI)	
		Not Adjusted for Time Since Last Penetration	Adjusted for Time Since Last Penetration
1	25/208 (12)	1	1
2–10	17/126 (13.5)	1.14 (0.59–2.21)	1.1 (0.56–2.14)
>10	10/76 (13.2)	1.11 (0.51–2.43)	1.16 (0.52–2.59)

but only 23 (20.9%) of the 110 subjects with a history of bleeding had definitive findings on examination (Table 5). No association was found between the number of reported penetrations and definitive findings, both before and after adjustment for time since last penetration (Table 6). Small proportions (12%–13.5%) of children in all groups had definitive findings of penetrative trauma (Table 6).

Further analysis of the 76 patients ≥10 years of age who reported >10 penetrations (Table 4) revealed that 53 were abused for >1 year; 11 reported abusive penile-genital penetration for ≥4 years. All except 1 of those 53 girls were abused by adults residing in their home. Seven (13.2%) of 53 girls who reported penetration on a frequent basis for >1 year had examination results that revealed definitive evidence of penetration.

Among the 22 patients with a history of both consensual and abusive penetrative contact, >80% had no definitive evidence of penetration (Table 1). Two reported >10 penetrative episodes. One reported a history of weekly forced intercourse for 5 years, whereas the other reported daily forced intercourse for 4 weeks. Both had no evidence of penetrative trauma on genital examination.

Case Example

One 12-year-old girl reported 209 incidents of penile-genital penetration involving her adult stepbrother over a period of >1 year. She recorded each event in a journal and provided rich details in her history, including a description of how the stepbrother pried her bedroom door open with a butter knife and incidents in which he hit her with "the cord from the radio." She indicated a specific date on which "he first had sex with me" and reported feeling a condom come off in her vagina while he had intercourse with her. She was not otherwise sexually active. She waited to tell because "he's got 4 kids" and disclosed because "he could do it to someone else." She described specific episodes of bleeding and pain. Her examination revealed a normal hymen with no clefts or notches.

DISCUSSION

The majority of children ≥10 years of age who reported >10 penetrative events had no evidence of penetrative trauma. We detected no association between the number of reported penile-genital penetrative events and definitive genital findings of healed trauma. This study establishes that child victims who report repetitive nonacute penetrative abuse have no definitive evidence of trauma on examination of the hymen in most cases.

Our study identified definitive findings of penetration for 10.7% of the subjects with no history of consensual sex. Although others identified abnormal findings for <5% of victims of child sexual assault,[2,4] those studies included victims of nonpenetrative abuse, male subjects,[4] and primarily young children.[2,4] A rate of abnormal findings of 5.5% was found for a subset of victims of penetrative abuse, but the

abuse included anal and digital penetration.[4] One study of 27 adolescent girls with a history of intercourse found that 33% had a healed transection in the posterior hymen.[3] The large proportion of definitive findings in this study may be a result of the selection criteria, which excluded boys, genital-genital contact without penetration, and digital penetration.

Our study found a low frequency of definitive examination findings for children ≥10 years of age who reported >10 penetrative events. There are several explanations for this, namely, injuries might have occurred and healed completely,[7,11] penetration might have occurred without injury, or some children might have interpreted or described nonpenetrative genital-genital contact as actual penetration. Some children may represent all events that breech the labia as penetration, although only those that breech the hymen can result in hymenal tears. This concept is supported by our findings that children <10 years of age were twice as likely to report >10 episodes of penetrative abuse but none of them had definitive findings of penetration. Although it is likely that trauma occurred and healed completely before the examination in at least some cases, it also is likely that some children did not experience complete penetration beyond the hymenal rim into the vaginal vault. Despite possible difficulties for some children in determining actual genital penetration, the child's disclosure regarding penetration can be important. The Texas Penal Code states that a sexual assault occurs if an individual "causes the penetration of the anus or sexual organ of a child by any means."[12] The absence of penetration may result in a lesser charge.

Our study included a group of patients with a history of consensual intercourse. Such adolescents have few or no discernible reasons to provide fabricated histories of consensual sexual contact to health care providers. This group might be better able to differentiate external genital touching from penetration. More than 80% of this group had no definitive findings of penetration. Both of the subjects in this group who reported >10 episodes of penetration had no definitive evidence of penetration.

Our finding of an association of abuse-related bleeding with definitive hymenal findings is consistent with previous research.[6] In our study and in a previous study,[6] however, the majority of girls who reported bleeding did not have findings diagnostic of penetrative trauma. In addition, many girls without a history of bleeding did have findings diagnostic of penetrative trauma. It is not known whether girls with findings of penetrative trauma underreport bleeding, are unaware of bleeding, or sustain injuries that do not result in bleeding. We also were unable to detect associations of pain, similar to previous research,[6] or dysuria with definitive findings.

Few studies of genital findings have included expert review of colposcopic photographs. Adams et al[3] used 2 expert reviewers and obtained κ values of 0.71 to 0.85 in a study of adolescent girls. Heger et al[4] reported 97% agreement by using an internal review. Our first review of 50 photographs yielded an agreement rate similar to that found by Heger et al.[4] The lower agreement rate in the second photographic review in this study might be attributable to several factors. First, cases reviewed included only deep notches and healed hymenal transections, differentiation of which is one of the most difficult differentiations in nonacute examinations. In contrast, other studies[3,4] included comparison cases without notches or transections, which possibly increased the chances of agreement. In addition, others studies analyzed the agreement rate regarding the location of findings and included acute findings and anal findings. In cases of disagreement, CAC evaluators were more likely to diagnose definitive trauma. Therefore, the large proportion of subjects with normal findings despite reports of repeated episodes of penetration is likely unrelated to CAC evaluators "undercalling" definitive findings.

Our study relied on the histories provided by the victims. This is the standard of care in medical evaluations of sexual abuse and is common for other diagnoses, such as headache and pain. Children do sometimes fabricate histories of sexual abuse, although this is uncommon, occurring in 2% to 8% of child sexual abuse cases.[13–17] We could not validate the number of penetrative events reported by the subjects in this study; however, in a case series of child victims of sexual abuse recorded on videotape, 60% underreported the sexual acts with respect to either severity or frequency and none overreported acts.[18]

This study has several additional limitations. A larger study sample may evaluate more fully the potential association between definitive findings and number of penetrations. Our study sample had 63% power to detect an OR of 2 and 94% power to detect an OR of 3 for definitive findings, comparing >10 episodes with 1 episode, at a 5% significance level. Although the statistical power of our study to detect an OR of 2 was not very high, our study demonstrates that many children who experience repetitive penetrative abuse have no definitive evidence of penetration. This study was retrospective; therefore, confirmation that the healed transections occurred after sexual assault was not possible. In the second photographic review, the agreement between the CAC examiners and expert reviewers was moderate to good but

not perfect; therefore, some healed hymenal transections might have been missed or misdiagnosed. However, most cases of disagreement involved the CAC examiners potentially overcalling healed transections. If those cases were truly overcalls, then the proportion of children with no evidence of penetration despite a reported history of multiple episodes of penetrative abuse would be even larger. Unavailable information, such as the duration of each episode and the age and developmental status of the perpetrator, might affect the findings. Finally, exclusion of the group of children who could not or would not disclose the number of penetrative events might have introduced bias. This bias was unavoidable, however, because those patients could not be used to evaluate the hypotheses of the study.

CONCLUSIONS

Most victims who reported repetitive penile-genital contact that involved some degree of perceived penetration had no definitive evidence of penetration on examination of the hymen. Similar results were seen for victims of multiple assault episodes over long periods of time, as well as for victims with a history of consensual sex. Children ≥10 years of age might have perceived and described penetration more accurately or might have been subjected to more penetrative abuse, compared with children <10 years of age.

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