

# A case-control study of anatomic changes resulting from sexual abuse

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**OBJECTIVE:** Our goal was to identify vulvar and hymenal characteristics associated with sexual abuse among female children between the ages of 3 and 8 years.

**STUDY DESIGN:** Using a case-control study design, we examined and photographed the external genitalia of 192 prepubertal children with a history of penetration and 200 children who denied prior abuse. Bivariate analyses were conducted by  $\chi^2$ , the Fisher exact test, and the Student *t* test to assess differences in vulvar and hymenal features between groups.

**RESULTS:** Vaginal discharge was observed more frequently in abused children ( $P = .01$ ). No difference was noted in the percentage of abused versus nonabused children with labial agglutination, increased vascularity, linea vestibularis, friability, a perineal depression, or a hymenal bump, tag, longitudinal intravaginal ridge, external ridge, band, or superficial notch. Furthermore, the mean number of each of these features per child did not differ between groups. A hymenal transection, perforation, or deep notch was observed in 4 children, all of whom were abused.

**CONCLUSION:** The genital examination of the abused child rarely differs from that of the nonabused child. Thus legal experts should focus on the child's history as the primary evidence of abuse. (*Am J Obstet Gynecol* 2000;182:820-34.)

**Key words:** Sexual abuse, sexual assault, children, hymen, genitalia

Child sexual abuse has reached epidemic proportions in the United States with >100,000 children sexually molested annually.<sup>1</sup> As a result, clinicians are frequently asked to evaluate young children after an episode of abuse, both to render treatment to the child and to collect legal evidence. For the clinician to make an educated determination of whether traumatic changes to the genitalia have occurred, he or she must have accurate information on normal anatomy and how it differs in those who have been sexually molested.

To date, however, few studies have been published on this topic. Those that have been published have method-

ologic limitations that make their findings difficult to interpret. For example, previous studies frequently grouped all patients who had a complaint of possible sexual abuse into a single category.<sup>2-5</sup> Thus both girls who were fondled on the labia and girls who were penetrated vaginally were classified as abused. These two kinds of abuse would not produce the same genital changes. Inadequate screening of controls for prior abuse<sup>2, 6, 7</sup> is another flaw in almost all studies on the appearance of the hymen in nonabused subjects. Failure to investigate potential prior sexual abuse in the "nonabused" group casts doubt on the validity of subject classifications and therefore the conclusions drawn from these studies.

Additional methodologic concerns relate to the examination or the interpretation of findings. For example, no studies on genital anatomy have used blinding to assure that the examiner is not influenced by the child's history. At least one study, however, has demonstrated that knowledge of the abuse status may influence the interpretation of the genital findings.<sup>8</sup> Furthermore, prior studies have used multiple examiners without photographic documentation of findings.<sup>2, 9, 10</sup> Without a visual record, interobserver reliability over time could not be measured.

Recent studies have screened nonabused subjects for prior assault and used photography to improve their methods of detection and documentation of abuse. Thus

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far, however, no study has compared abused and nonabused subjects by means of these superior techniques. Instead, studies in which these techniques were used have focused on either abused or nonabused subjects and used reports from the literature to compare their findings.<sup>3, 6, 11, 12</sup> These methods, however, may result in the comparison of dissimilar populations or fail to account for differences between the studies in nomenclature or definitions used.

A review of the literature on the morphologic characteristics of the external genitalia readily demonstrates the inconsistencies in the literature that have resulted from these methodologic problems. For example, Emans et al<sup>2</sup> observed that intravaginal ridges occurred significantly more often in abused than in nonabused subjects (8% vs 0%;  $P < .01$ ) and proposed a causal relationship. In contrast, studies by Berenson et al<sup>6</sup> and McCann et al<sup>11</sup> observed intravaginal ridges in 25% to 89% of nonabused subjects, a much higher percentage than that observed in either population by Emans et al.<sup>2</sup> Data on the significance of increased vascularity of the hymen are similarly conflicting. Emans et al<sup>2</sup> observed increased vascularity in 18% of sexually abused subjects as compared with 3% of nonabused girls and concluded that sexual abuse resulted in vascular changes. Gardner,<sup>7</sup> however, noted increased vascularity in an even higher percentage of nonabused subjects (37%) than was observed by Emans et al<sup>2</sup> in either group.

In summary, the literature on child sexual abuse in prepubertal children is contradictory on what signs are associated with abuse and what are normal anatomic features of the genitalia. These discrepancies are not merely academic concerns but instead strongly influence the determination of possible sexual abuse by the medical and legal communities. The purpose of this study was to identify vulvar and hymenal characteristics associated with digital or penile penetration within a population of female children aged 3 to 8 years. Multiple methods of screening were used to classify subjects as abused or nonabused, and photographic documentation was utilized to identify findings.

## Methods

**Recruitment.** Children eligible for participation in this case-control study were prepubertal female children (with Tanner stage I breast development) between the ages of 3 and 8 years who were white, African American, or Hispanic and were examined at one of two pediatric clinic sites between December 1994 and December 1997. Children with a history of digital or penile penetration (case subjects) were recruited at the Child Protective Health (CPH) Clinic located in Texas Children's Hospital, Houston, Texas, and nonabused subjects (control subjects) were recruited from the waiting rooms of the pediatric clinics at The University of Texas Medical

Branch (UTMB). Criteria for study inclusion were the same for abused and nonabused subjects with regard to gender, age, breast development, and ethnicity. Additional exclusion criteria for nonabused subjects included a confirmed or suspected history of sexual abuse, current genitourinary complaints, a prior speculum examination, and a history of trauma that caused bruising or bleeding to the genital area. Furthermore, nonabused subjects were recruited so as to achieve a frequency match with respect to the age and ethnicity of abused subjects.

## Procedure

**Screening for abuse.** After informed, written consent was obtained from the parent and verbal assent was obtained from the child, screening was conducted at each center to confirm that the child had been correctly classified. Children reporting digital or penile penetration who were referred to the CPH clinic for a medical evaluation and met the eligibility criteria were screened by a research nurse using the Digital/Penile Vulvar Penetration Rating Scale (Fig 1). After informed, written consent was given, the research nurse assessed the case on 8 items. Seven items were scored as 1 (unlikely), 5 (possible), or 10 (highly likely), whereas the remaining item, "history of sexually transmitted diseases," contained only 2 scores—1 (none) and 10 (present). The items were weighted with the greatest weight given to the history provided by the child and confession by the perpetrator. The response to item A (child statement) was multiplied by a factor of 4 and G (perpetrator confession) by a factor of 3. The remaining items were scored as listed. The highest possible composite score was 130. On the basis of clinical experience, the investigators used a raw score of  $\geq 51$  as an indicator that digital or penile penetration was highly likely.

Each child in the nonabused group was screened by a psychologist or research nurse in several ways to confirm that she had not previously been abused: (1) The parent was asked on first contact whether any member of the family suspected that the child may have been sexually abused; (2) the Child Sexual Behavior Inventory (CSBI),<sup>13</sup> a 37-item questionnaire developed to detect undisclosed abuse, was completed by the parent and immediately scored by the research team; (3) the child was interviewed in private by a trained research nurse, psychologist, or social worker; (4) the UTMB medical record of each child was reviewed to determine whether there had ever been a prior report or evaluation of sexual abuse. If the chart review or the interview of the parent or child revealed possible sexual abuse or the CSBI score was in the abnormal range ( $>12$ ), the child was excluded from further participation in the study. Children who reported previously undisclosed abuse were referred to the primary care physician or Child Protective Services for further evaluation.

Categories	Scoring system
A. Digital or penile vulvar contact/penetration	1 "He touched me with his pee pee/finger" (points to lower abdomen)
	5 "He rubbed or touched my privates (or other terms) with his wiener"
	10 "He put his pee pee/finger (or other terms) in my tee tee (or other terms) and may point to the vulvar area with one finger"
B. Incident hurt the child	1 Felt nothing at all or doesn't remember
	5 It tickled/felt funny/or burned
	10 It hurt
C. Genital discharge, dysuria, and odor close to the incident	1 None
	5 Mild discharge, dysuria, and odor off and on
	10 Heavy discharge, dysuria, and odor
D. Blood following the incident	1 Nothing at all
	5 Something pink
	10 Something red or blood
E. Number of incidents of digital or penile vulvar penile penetration	1 None
	5 Occurred one to two times
	10 Occurred more than two times, so many can't remember
F. Witness at the scene	1 None
	5 Witness at the scene who can verbalize description of what may be digital or penile vulvar penetration
	10 Witness at the scene who can verbalize description in detail of digital or penile vulvar penetration
G. Confession by perpetrator	1 None
	5 Partial admission; statement that suggests contact
	10 Confession obtained
H. History of STD (gonorrhea, chlamydia, syphilis, herpes, trichomonas)	1 None
	10 Present

Fig 1. Digital/Penile Vulvar Penetration Rating Scale.

*Standardization of recruitment sites.* Several steps were taken to ensure that similar methods for examination and photography were used at both centers. Before subject recruitment, teams from both sites met over a 5-month period to develop standardized procedures for examination and photography. Identical examination gloves, film, and photographic equipment were purchased for both sites. A protocol was developed to standardize the positioning of the child during the examination and the position of the clinician's hands while exposing the hymen. In addition, a protocol was developed to standardize the number and order of the photographs taken and the angle of the camera during each exposure (two photographs at each angle). All film was developed at UTMB and displayed in identical plastic

slide mounts. Implementation of this protocol with actual children was practiced before the study's initiation with both teams present. To ensure that similar procedures were used at both sites throughout the study period, a research nurse from UTMB periodically visited CPH to confirm that photographs were being taken with the same setup and in the same manner at both sites. These standardizations prevented group status from being determined at the time of slide review by a factor unrelated to hymenal anatomy.

To evaluate whether the two reviewers could identify the recruitment site when slides were reviewed, each reviewer was asked to guess the recruitment site after looking at all slides of an individual subject. Analysis with the use of  $\kappa$  statistics ( $\kappa = 0.13$  and  $\kappa = 0.10$ ) demonstrated

that the reviewers were unable to identify the recruitment site significantly more often than what would be expected by chance.

*The examination.* After it was confirmed that the developmental stage of the breasts was Tanner stage I, the external genitalia of all children who met inclusion criteria for either group were examined and photographed with the child in the supine and knee-chest positions. Four children (three abused and one nonabused) who did not agree to be examined in the knee-chest position were photographed in the supine position only. All children recruited at UTMB were examined by a single physician (Abbey B. Berenson, MD) whereas those at CPH were examined by one of two physicians (Mariam R. Chacko, MD, and Clifford O. Mishaw, MD). The mean number of photographs taken per child was similar at both sites (21.5 at UTMB vs 21.4 at CPH).

At both centers a trained specialist interacted with the child and used distraction techniques, such as books, music, or videotapes, to decrease anxiety during the examination. With the child in the supine position, a trained nurse exposed the hymen using the labial traction technique (the lower portion of the labia majora was grasped between the thumb and index fingers and gently pulled outward). In some cases (five abused and nine nonabused), when the hymenal edges could not be well visualized because of adherence to the vestibule, sterile water was applied to better expose the hymen. If the vagina still could not be visualized in either position, the subject was excluded from the study and replaced with another child of the same age, ethnicity, and abuse status. All features observed at the time of examination were recorded on a standardized data sheet by the physician who examined the patient. All photographs of the vulva and the hymen were taken with a hand-held Nikon (F-3) 35-mm camera and a 105-mm micro-Nikon lens with a fully extended 52.5-mm extension ring and ring flash resulting in magnification of 1.2 times.

After the examination, the nurse compensated the family \$25 for their participation. In addition, each child in the nonabused group was given a coloring book on sexual abuse prevention.

*Slide reviews.* Definitions of features were established at the beginning of the study after a pilot review of 84 subjects. These definitions were reviewed before each session to maximize reliability between observers and across slide review sessions. Features observed at examination were displayed on a chalkboard to assist the reviewers. However, only those findings that could be confirmed during the slide review were included in the final data set.

Approximately 20 to 30 minutes was expended in the review of each subject. First, all slides of a subject were viewed independently by each of the two reviewers, who coded their observations in both the supine and knee-

**Table I.** Outcome variables evaluated and whether quantity and location were reported

<i>Feature</i>	<i>Quantity or location</i>
Vaginal discharge	
Vulvar	
Partial agglutination	
Prominent vessels or erythema	
Linea vestibularis	
Friability	
Perineal depression	
Ecchymosis	
Laceration	
Hymenal	
Increased pigmentation	
Prominent vessels	
Configuration	
Periurethral band	Yes
Vestibular band	Yes
Superficial notch	Yes
Deep notch	Yes
Transection	Yes
Perforation	Yes
Intravaginal ridge	Yes
External ridge	Yes
Bump	Yes
Tag	Yes

chest positions on a standardized form. Findings for each subject were then discussed by the examiners. When differences were noted, the slides were re-reviewed and discussed until consensus was reached.

To assess reliability in definitions and reporting of data across time, 10% of subjects were re-reviewed at a subsequent session with the same methods used in the initial review. Any differences in findings between the first and second reviews were discussed until consensus was reached. The agreement between the first and second reviews ranged from 93% to 100% for all variables, with the exception of prominent vessels/erythema, which had an 80% agreement rate.

*Definitions of observed features.* The presence or absence of 21 separate vulvar or hymenal features was recorded when ascertained on the slides (Table I). Vulvar features recorded included partial labial agglutination, prominent vessels or erythema, linea vestibularis (also termed *midline sparing*),<sup>14</sup> friability, perineal depressions, ecchymosis, and lacerations. Friability was recorded when the epithelium appeared to have been disrupted and blood was present. A perineal depression was recorded when a linear or V-shaped depressed area of skin was observed in the midline of the perineum (Fig 2).

The hymenal configuration was classified as having tissue present 360° (annular) or an absence of tissue anteriorly (crescentic). If a notch was present at 12 o'clock but did not extend more than halfway through the membrane, the configuration was classified as annular with a notch at 12 o'clock. Furthermore, notations were made if the hymen had a septum, ruffled edge (fimbriated), or small, anteriorly displaced opening (microperforate; Fig 3).



Fig 2. Perineal depression in 5-year-old African American girl without history of abuse.

Additional hymenal features recorded included increased pigmentation, prominent vessels or erythema, and the presence and location of periurethral bands, vestibular bands, hymenal notches, transections, perforations, longitudinal intravaginal ridges, external ridges, bumps, and tags. Location was noted according to the face of a clock with the child in the supine position; 12 o'clock was located ventrally under the urethra and 6 o'clock was located dorsally near the fourchette. Longitudinal intravaginal ridges were not noted at 12 o'clock because of the location of the urethra at this position. Longitudinal intravaginal ridges were recorded only if it could be determined at examination or by slide review that the ridge extended to the hymenal rim (Fig 4).

A notch was defined as a U or V-shaped concavity that dipped beneath the baseline of the membrane or caused a break in the membrane (Fig 5). In a manner similar to the definition used by Kerns et al,<sup>3</sup> we attempted to limit our definition of notches to those areas that deviated from the pattern of the remainder of the hymen and not include areas that appeared as concavities only because of their proximity to a projection, such as a bump or tag. The extent of a notch was classified as superficial (less than or equal to half of the width of the membrane) or deep (more than half of the width). A notch that extended to the vestibule was termed a *transection* (Fig 6). Notches were not recorded in the fringed hymen, because of its fringed nature, or between 11 and 1 o'clock in a crescentic hymen, where there is a normal absence of hymenal tissue.

A bump was defined as a mound on the membrane

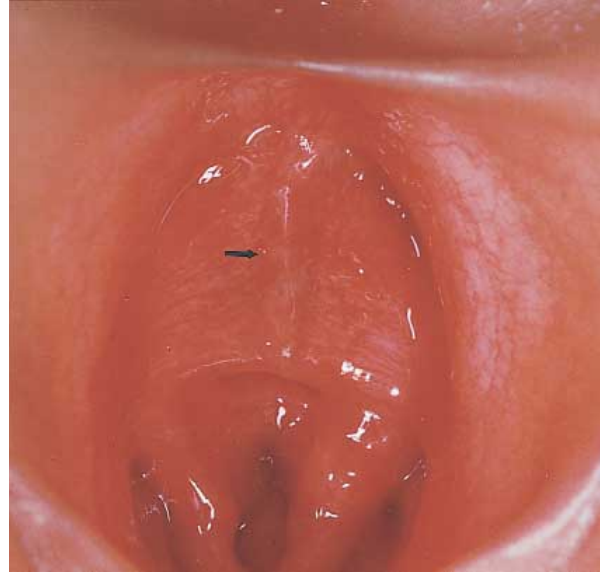


Fig 3. External ridge on microperforate hymen in 6-year-old abused Hispanic girl (knee-chest view).

that had a width greater than its length (Fig 4). Symmetric wings on the lateral portion of the hymen were not classified as bumps. When a bump was identified, its origination was classified as extending from an external or longitudinal intravaginal ridge, from the inner edge, or from the membrane. Both notches and bumps were recorded only when visible on photographs taken straight on (not at an angle) and when the feature did not smooth out in subsequent photographs. It was not possible to observe these features on redundant hymens when the edges were "flopped out."

A tag was defined as a protrusion of tissue on the membrane whose length exceeded its width. Tags were identified as extending from a ridge or the inner edge. Vestibular bands extending from the vestibule to the hymen were classified as periurethral if immediately adjacent to the urethra and vestibular if located elsewhere on the hymen. These features were recorded when both sides of the band could be visualized on the slide and the point at which the band attached to the mucosa was visible. The number of each feature was counted and its location was noted.

**Statistical analysis.** All data collected in this study were automated by the project coordinator, who was trained in data entry and management techniques. To ensure accuracy, a random 10% of data entries were verified by a second trained assistant; agreement of  $\geq 99\%$  was observed across all data items.

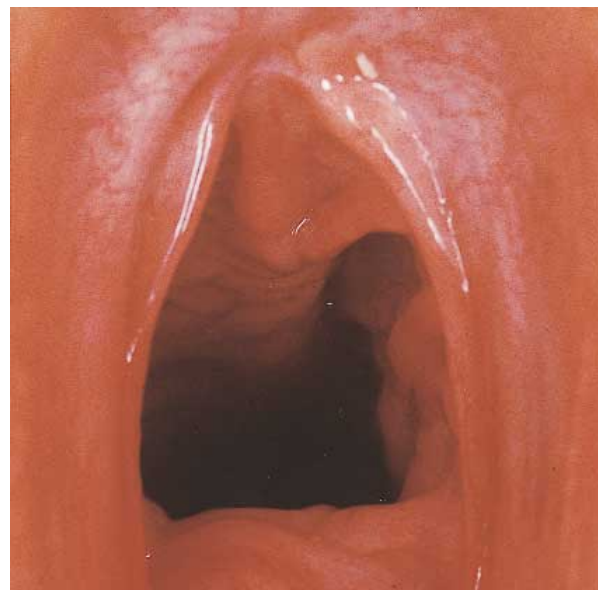
Event rates for the abused versus the nonabused group were conducted with the Fisher exact tests (or  $\chi^2$  when appropriate). The Student *t* test was used for comparisons made between groups for the number of hymenal



**Fig 4.** Multiple bumps extending from longitudinal intravaginal ridges (marked by *arrows*) and rim in 8-year-old African American girl without history of abuse. U-shaped notch is present at 9 o'clock.



**Fig 5.** Superficial notch at 6 o'clock (*arrow*) in 6-year-old white girl without history of abuse (knee-chest view).



**Fig 6.** Transection at 6 o'clock in 7-year-old abused Hispanic girl (knee-chest view).

features present. Significance was defined as  $P \leq .05$ . Vulvar and hymenal features were classified as present if observed in the supine or knee-chest position. The Student *t* test was used to compare mean numbers of findings between groups. To determine whether hymenal features differed by age or race, these same outcomes were compared between abused and nonabused patients within age group (3–4 years old, 5–6 years old, 7–8 years old) or race (white, African American, or

Hispanic) categories. In addition, we stratified abused subjects by type of penetration reported (penile vs digital), number of days since the abuse ( $\leq 7$  vs  $> 7$ ), number of times vaginal penetration occurred ( $< 3$  vs  $\geq 3$ ), and whether pain or bleeding occurred at the time of the abuse (yes vs no) to determine whether hymenal features differed among these groups. We originally planned to conduct multivariate regression analyses to develop a multiple predictor model of abuse. However, statistical





Fig 7. Fusion of labia to hymen in 7-year-old abused African American girl.

**Table II.** Number and percentage of abused versus nonabused children with each vulvar feature

<i>Vulvar feature</i>	<i>Abused (n = 192)</i>	<i>Nonabused (n = 200)</i>	<i>Statistical significance</i>
Vaginal discharge	21 (11%)	8 (4%)	$P = .01$
Partial agglutination	24 (13%)	14 (7%)	$P = .09$
Prominent vessels or erythema	79 (41%)	74 (37%)	$P = .41$
Linea vestibularis	13 (7%)	13 (7%)	$P = 1.0$
Friability	1 (1%)	7 (4%)	$P = .07$
Perineal depression	4 (2%)	4 (2%)	$P = 1.0$
Ecchymosis	1 (1%)	0 (0%)	$P = .49$
Laceration	1 (1%)	0 (0%)	$P = .49$

models (eg, logistic regression) were not fit to these data because of the small number of clinically important findings. All analyses were conducted with the SPSS statistical software.<sup>15</sup> This study was approved by the institutional review boards of UTMB and Baylor College of Medicine.

## Results

**Enrollment.** During the 3-year period of recruitment, a total of 227 children who met inclusion criteria were evaluated at the CPH clinic. Twenty-seven children or their parent/guardian (12%) refused to participate. The hymenal features of eight additional children could not be evaluated because of the presence of complete agglutination ( $n = 4$ ), failure of the hymen to open ( $n = 2$ ), or otherwise unacceptable photographs ( $n = 2$ ). Thus 192 abused children were included in the final analyses of vulvar and hymenal features; 77 (40%) were white, 73 (38%) were Hispanic, and 42 (22%) were African American. Abused children who were and were not in-

cluded in the study did not differ by ethnicity. The median length of time from the last episode of abuse to the examination was 42 days.

The control group consisted of 200 children examined at UTMB who met all study criteria, agreed to participate, and had acceptable photographs. Because recruitment efforts at UTMB were directed toward matching the age and race of the CPH subjects, the final sample consisted of the following: 67 (34%) white, 78 (38%) Hispanic, and 55 (28%) African American. Five hundred fourteen families of the correct age and race declined to participate when approached by the research team. The hymenal features of 15 additional children could not be evaluated because of unacceptable photographs ( $n = 7$ ) or complete agglutination ( $n = 8$ ). Comparison by ethnicity of nonabused children who were and were not included in the study demonstrated that African American families were more likely to agree to participate than were white or Hispanic families (41% vs 28% and 23%, respectively).

**Vulvar features.** Only one significant difference was noted when the observed vulvar features were compared between the two groups (Table II). Vaginal discharge was observed more frequently in abused than in nonabused children (11% vs 4%;  $P = .01$ ). The percentage of children with complete or partial agglutination, prominent vessels or erythema, linea vestibularis, friability, or a perineal depression did not differ between the two groups. A vulvar laceration and ecchymosis were each noted in only one abused child.

One unanticipated vulvar finding was noted in four children. Fusion of the labia minora to the hymenal membrane resulting in an asymmetric appearance (Fig 7) was observed in three abused children and one child

**Table III.** Number and percentage of abused versus nonabused children with each hymenal feature

Hymenal feature	Abused (n = 192)	Nonabused (n = 200)	Statistical significance
Prominent vessels	15 (8%)	13 (7%)	<i>P</i> = .70
Periurethral bands	180 (94%)	189 (95%)	<i>P</i> = .83
Vestibular bands	104 (55%)	120 (60%)	<i>P</i> = .31
Notches			
Superficial	13 (7%)	10 (5%)	<i>P</i> = .52
Deep	2 (1%)	0	<i>P</i> = .24
Transection	1 (1%)	0	<i>P</i> = .49
Perforation	1 (1%)	0	<i>P</i> = .49
Longitudinal	170 (89%)	174 (87%)	<i>P</i> = .65
intravaginal ridges			
External ridges	15 (8%)	16 (8%)	<i>P</i> = 1.0
Bumps	87 (46%)	92 (46%)	<i>P</i> = .92
Tags	5 (3%)	10 (5%)	<i>P</i> = .29

without a history of abuse (*P* = .36). This finding was located on the inferior portion of the hymen in all three abused children and laterally in the one child without an abuse history.

**Hymenal features.** Comparison of hymenal configuration demonstrated only one difference between the two groups. A septate hymen was observed more often in abused than nonabused children (4% vs 1%; *P* = .03). No differences were observed between case subjects and control subjects in the number of children with a crescentic, annular, microperforate, or fimbriated hymen. Overall the crescentic configuration was the most common type in both abused and nonabused children (78% vs 82%; *P* = .34).

Increased pigmentation of the hymenal membrane was observed in four children, all of whom were in the control group. In two of these cases a small red lesion was noted on the inferior half of the hymen. The third child had multiple red areas on the superior and inferior halves of the hymen that appeared to be focal hemorrhages. The fourth was an African American child with two black pigmented lines that were located on the inferior portion of the hymen.

A total of 29 superficial or deep notches were observed in 26 children. There was no significant difference in the percentage of abused versus nonabused children with at least one hymenal notch (Table III). Furthermore, the mean number of notches per child did not differ between the two groups (Table IV). When notches were classified by shape, no association was noted between the shape of the notch (U or V) and abuse status. Notches with a U shape were observed in 50% of abused and 42% of nonabused children, whereas those with a V shape were present in 50% of abused and 58% of nonabused children. When notches were classified by depth, no difference was noted in the prevalence of a superficial notch between abused and nonabused children. However, deep notches and transections were observed

**Table IV.** Mean number of hymenal features observed per child in abused versus nonabused children

Hymenal feature	Abused (n = 192)	Nonabused (n = 200)	Statistical significance
Periurethral bands			
Right	1.39 ± 0.79	1.30 ± 0.69	<i>P</i> = .22
Left	1.31 ± 0.73	1.31 ± 0.74	<i>P</i> = .98
Vestibular bands	0.97 ± 1.18	1.17 ± 1.27	<i>P</i> = .12
Notches/transection	0.09 ± 0.30	0.06 ± 0.28	<i>P</i> = .32
Longitudinal	2.36 ± 1.48	2.24 ± 1.39	<i>P</i> = .39
intravaginal ridges			
External ridges	0.08 ± 0.27	0.08 ± 0.27	<i>P</i> = .98
Bumps	0.72 ± 0.95	0.68 ± 0.92	<i>P</i> = .72
Tags	0.03 ± 0.16	0.06 ± 0.28	<i>P</i> = .14

only in abused children (Fig 6). One additional abused child had a hymenal perforation within the central portion of the posterior hymenal tissue (Fig 8).

No significant difference was noted in the percentage of abused versus nonabused children with at least one bump in the supine or knee-chest position (46% vs 46%). In addition, no significant difference was noted between groups when only those bumps that persisted in both positions were considered (28% vs 25%). Examination of the origination of each bump demonstrated that bumps were caused by the intersection of a longitudinal vaginal ridge or external ridge with the rim 70% of the time among abused children and 75% of the time among nonabused children with this finding (*P* = .25; Fig 4). No difference was noted in the percentage of bumps originating from the inner edge in abused versus nonabused children (30% vs 21%; *P* = .08). Three nonabused children but no abused children had a bump on the flat surface of the hymenal membrane (*P* = .09). Similarly, no difference was noted in the percentage of tags originating from the inner edge in abused versus nonabused children (3% vs 3%; *P* = .83) or in the percentage of tags originating from a longitudinal intravaginal ridge (0% vs 2%; *P* = .07).

Comparison of other hymenal features demonstrated no differences between the two groups. No difference was noted in the percentage of abused versus nonabused children with at least one periurethral band, vestibular band, longitudinal intravaginal ridge, external ridge, or tag (Table III). The mean number of each of these features per child also did not differ between the two groups (Table IV).

**Location.** To determine whether certain features were present more commonly among abused children on either half of the hymen, the superior half (between 9 and 3 o'clock inclusively) and the inferior half (between 3 and 9 o'clock) were examined separately and compared between the two groups. No differences were observed in the percentage of abused versus nonabused children with a periurethral band, vestibular band, superficial notch, longitudinal intravaginal ridge, external





Fig 8. Hymenal perforation in 7-year-old abused Hispanic girl (knee-chest view).

Table V. Number and percentage of abused versus nonabused children with each hymenal feature observed at least once in superior or inferior portion

Hymenal feature	Superior			Inferior		
	Abused	Nonabused	Statistical significance	Abused	Nonabused	Statistical significance
Vestibular bands	49 (26%)	54 (27%)	$P = .82$	88 (46%)	106 (53%)	$P = .19$
Notches						
Superficial	5 (3%)	4 (2%)	$P = .75$	7 (4%)	4 (2%)	$P = .37$
Deep	0 (0%)	0 (0%)	—	2 (1%)	0 (0%)	$P = .24$
Intravaginal ridges	151 (79%)	146 (73%)	$P = .20$	121 (63%)	149 (75%)	$P = .02$
External ridges	0 (0%)	0 (0%)	—	15 (8%)	16 (8.0%)	$P = 1.0$
Bumps	54 (29%)	48 (24%)	$P = .36$	60 (32%)	68 (34%)	$P = .59$
Tags	5 (3%)	3 (2.0%)	$P = .72$	2 (1%)	5 (3%)	$P = .45$

ridge, bump, or tag on the superior half of the hymen. When the inferior half of the hymen was compared between the two groups, the only differences noted were that longitudinal intravaginal ridges were more common in nonabused children ( $P = .02$ ) and that the two deep notches seen in the abused cohort both appeared on the inferior half of the hymen (Table V).

**Effect of age and race/ethnicity.** Finally, patients were subdivided into three age categories (3–4 years old, 5–6 years old, and 7–8 years old) and three race/ethnic groups (white, African American, and Hispanic) to determine whether vulvar or hymenal features differed by age or race. No differences were noted between abused and nonabused children in any of the three age categories. Examination by race demonstrated that abused white children were significantly more likely than nonabused white children to have a vaginal discharge (10% vs 2%;  $P = .04$ ) or partial labial agglutination (20% vs 8%;  $P = .05$ ). No differences in vulvar or hymenal features were

observed between abused and nonabused children within groups of African American or Hispanic children.

**Secondary analyses.** When abused subjects were stratified by number of days since the abuse ( $\leq 7$  vs  $> 7$ ), type of penetration reported (digital vs penile), and number of times vaginal penetration occurred ( $< 3$  vs  $\geq 3$ ), several differences emerged. First, vaginal discharge was noted more frequently among children who had been abused within the last 7 days as compared with those who had been abused  $> 7$  days ago or those without a history of abuse (24% vs 12% and 4%;  $P = .002$ ). Vaginal discharge was also more common among those who reported penile penetration as compared with those who reported digital penetration or no abuse (14% vs 7% and 4%;  $P = .007$ ) and among those who reported three or more episodes of abuse as compared with those who reported fewer than three episodes or no abuse (17% vs 9% and 4%;  $P = .001$ ). Second, a deep notch was noted more frequently among children who had been abused within the

last 7 days as compared with those who had been abused >7 days ago or nonabused children (6% vs 1% and 0%;  $P = .01$ ). Finally, children who reported three or more episodes of abuse were more likely than those who reported fewer than three episodes or no abuse to have a superficial notch (14% vs 0% and 5%;  $P = .001$ ). No vulvar or hymenal differences were noted when children were stratified by whether they reported pain or bleeding at the time of the abuse.

### Comment

This is the first case-control study to compare genital characteristics of sexually abused and nonabused girls by means of photographic documentation of findings. To avoid problems associated with prior studies on sexual abuse, rigorous methods were used throughout the project. First, steps were taken to ensure that observed differences were not caused by differences in age, race, or pubertal status. In contrast to prior studies that have combined children of different ages and stages of development,<sup>2, 7, 12, 16</sup> we limited our sample to those years when serum estrogen levels are at their lowest. Second, recruitment of nonabused subjects was directed toward matching the age and racial distribution of abused subjects to ensure that the two populations were comparable. Finally, we stratified subjects by age and race to determine whether certain differences were only applicable to a subset of the population. These steps ensured that any differences noted would result from the abuse status of the subject rather than age, race, or estrogen status.

A second way that this study differed from prior studies on hymenal anatomy is that we used multiple screening methods in both the abused and nonabused populations to confirm that the patient was correctly classified. First, all children were interviewed in private to confirm the history rather than relying on information provided by the parent or Child Protective Services. Second, the CSBI, which has been demonstrated to be both reliable and valid,<sup>13</sup> was administered to detect undisclosed abuse among the control population. Finally, we used the Digital/Penile Vulvar Penetration Rating Scale to determine whether penetration had occurred. This scale was developed for use in this study because there was no published scale that used historical features to determine whether digital or penile penetration had occurred. Although its validity and reliability have not been established, the rating scale was based on many years of clinical experience.

Finally, photographs were used to document all findings. Use of photographs allowed the investigators to observe features missed at examination and provided grounds for consensus. The photographs also provided examiners with a consistent technique for data collection, measurement, and review and allowed the reviewers to measure reliability over time. This is critical in a field

where new knowledge is constantly emerging and definitions or ideas are subject to change.

We observed, as have others, that partial agglutination is suggestive of abuse among white children. For example, Berkowitz et al<sup>17</sup> observed that 6 of 10 patients referred for sexual abuse evaluations had labial agglutination and concluded that sexual abuse predisposes a child to this disorder. McCann et al<sup>18</sup> made a similar conclusion after he examined six white children with agglutination who had all been molested.<sup>19</sup> A study on prepubertal children, however, observed complete or partial agglutination in 22% of children without a history of abuse.<sup>6</sup> We noted that 7% of nonabused children who participated in this study had partial agglutination, demonstrating that this finding is suggestive but not diagnostic of abuse. Furthermore, this finding reached significance only among white children. Similarly, our finding that vaginal discharge is more common among children with a history of abuse supports that this characteristic is suggestive of abuse. This finding is not pathognomonic for abuse, however, because other conditions, such as infections or a foreign body, may predispose a child to a vaginal discharge.

This study also clarifies the significance of a notch on the hymenal rim. Prior investigations on abused and nonabused children have suggested that both superficial and deep notches on the inferior half of the hymen are suggestive of abuse. For example, Emans et al<sup>2</sup> observed notches in three sexually abused girls in their comparison study but not in a single nonabused subject, and they concluded that this finding was suggestive of abuse. Kerns et al<sup>3</sup> came to a similar conclusion after observing posterior or lateral indentations in 100 out of 1383 (7%) female children who were suspected victims of sexual abuse. A prior study of 211 girls classified as nonabused subjects from this institution did not detect any inferior notches, suggesting that this finding did not occur in the absence of abuse.<sup>6</sup> In the current study, however, superficial notches on the inferior half of the hymen were observed in seven nonabused subjects, demonstrating that this finding may be present in the absence of abuse. However, notches extending >50% through the membrane were detected in only two abused children. Similarly, both the child with the transection and the child with the perforation on the inferior portion of the hymen had a history of abuse. Thus a deep notch, transection, or perforation on the inferior portion of the hymen may be considered as a definitive sign of sexual abuse or other trauma.

Two findings that we observed in abused children deserve special mention. One child had a perforation in the posterior portion of the hymenal membrane separate from the hymenal edge. In a case series of four girls, Hostetler et al<sup>20</sup> observed that this type of injury usually results from penetration of the hymen with a sharp ob-

ject. In three of these previously reported cases, the injury resulted from an accidental fall. The hymen of the fourth child was perforated during an episode of sexual abuse when the perpetrator attempted to introduce an object into the vagina. Injuries of this nature often heal poorly and may leave a small, well-demarcated fenestration as we observed. In addition, we noted an attachment or fusion between the labia minora and hymen in four children, three of whom had been abused. Muram and Jones<sup>21</sup> observed that this type of attachment may result from a prior hymenal injury. During the healing process, a scar is formed that binds the labia to the vaginal wall. Our observation of this finding in three abused children lends credence to this theory.

Overall, we detected few differences in anatomic findings between abused and nonabused children. In fact, examination of the number of times each hymenal feature appeared in a single child demonstrated remarkably similar findings between the two groups. Although the difference was not statistically significant, it was noted that several features (hymenal transections, perforations, and deep notches, as well as vulvar lacerations and ecchymosis) were observed only in abused children. However, findings unique to abused children were noted in only 2.5% of subjects.

A failure to demonstrate significant differences in this population may be because of timing of the sexual abuse evaluation. Many children had been abused weeks to months before they were seen at the CPH clinic. In fact, only 17 abused children were examined within 7 days of the abuse. If the hymen heals, as suggested in case series by McCann et al,<sup>18</sup> then differences in hymenal anatomy would be difficult to detect after a prolonged period of time. Future studies should focus on whether differences may be detected between nonabused children and children who undergo an early evaluation after an episode of sexual assault. However, even if differences could be detected, it should be noted that most children with a history of abuse are not evaluated within a few days of the episode. Therefore our negative findings most likely represent what the clinician can expect to detect among most children seen in a sexual assault center.

It does not appear that the negative findings reported in this study were caused by inadequate power. In fact, there even appeared to be sufficient power when the proportions being compared were small. For example, the Fisher exact test with a .05 2-sided significance level had 88% power to detect the difference between a nonabused group event rate of 5% and an abused group rate of 15% with the study sample sizes of 200 and 192, respectively. Smaller odds ratios closer to 2, however, were not detectable with 80% power (for example, 5% of nonabused vs 10% of abused; odds ratio 2.1, power 39%).

In addition to demonstrating that few anatomic differences may be detected by abuse status, we observed that

few differences occur as a result of aging between 3 and 8 years. Prior studies have observed that hymenal features change with aging.<sup>6</sup> For the most part, however, these developmental changes are the result of shifts in estrogen levels. Failure to detect differences by age in our study most likely reflects that fact that we included only prepubertal girls in a narrow age range. This finding supports the merging of children between ages 3 and 8 in future studies on hymenal features but does not support the merging of this group with younger or older children.

In contrast to prior studies that have reported findings suspicious for or diagnostic of abuse in 15% to 64% of abused children,<sup>4, 5, 22</sup> we noted findings consistent with prior trauma in <5% of abused subjects. Some degree of difference can be attributed to the fact that we did not include children with positive cultures for sexually transmitted diseases or those with suspicious anal findings when calculating the percentage with abnormal findings. Most of the difference, however, can be attributed to differences in methods between our study and those previously published. Our study was limited to prepubertal girls between ages 3 and 8 years whereas others have included boys<sup>5, 16</sup> or mixed prepubertal and postpubertal girls in the same sample.<sup>5, 10, 12, 16</sup> Most important, none of these studies included a control group. Thus it could not be determined whether findings were accurately labeled as suspicious of abuse. For example, Muram<sup>22</sup> listed a healed laceration of the hymen as specific for abuse, yet little is understood about how the hymen appears after an injury. Similarly, Kerns et al<sup>3</sup> included narrowing of the hymenal rim as an abnormal finding, and Adams et al<sup>12</sup> included a scar of the posterior fourchette in their list of anogenital findings suggestive of molestation. Unless the child had been examined previously, it is not possible to determine whether the hymenal rim has narrowed. Furthermore, a white line on the posterior fourchette may be a congenital feature (linear vestibularis) and not a scar. If we had used similar methods and not included a control group, many more subjects in our abused group would have been labeled as having findings indicative of possible abuse. For example, the superficial notch observed on the inferior half of the hymen of seven abused children was not considered abnormal because this finding was also seen in nonabused children.

Two limitations of this study bear mentioning. First, we examined only prepubertal girls between the ages of 3 and 8 years. Results of this study are not applicable to older and younger children, because estrogen can markedly affect the appearance of the hymen.<sup>23, 24</sup> Second, few of the abused children in this study were examined within a week of the abusive event. In fact, the median length of time between the last episode of the abuse and the examination was 42 days. This most likely affected our ability to detect differences between abused

and nonabused children, because prior studies have suggested that injuries to this area can heal rapidly.

In conclusion, this study demonstrates that only a few vulvar or hymenal findings are reliable indicators of sexual abuse among prepubertal girls. Furthermore, these findings are infrequently observed among children who are examined at a sexual assault center. In fact, findings strongly suggestive of sexual abuse were observed in <5% of abused children. Therefore genital examination is unlikely to support or negate the child's history. Thus it is critical that legal experts focus on the child's history as the primary evidence of sexual abuse.

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#### Discussion

**DR RONALD A. CHEZ**, Tampa, Florida. Once again this Society has given me the privilege of commenting on the clinical research of Dr Berenson. And once again she and her colleagues have provided this Society with data that were carefully collected, thoughtfully analyzed, and of considerable clinical importance. The article itself needs to be read slowly, carefully, and more than once to digest the observations she and her colleagues have made. I believe it is work that will serve as the standard for future research in this area of medicine.

The term *sexual abuse* refers to acts of sexual exploitation without consent, without equality, and with the use of coercion. The perpetrator's motives and sources of gratification are often an admixture of sexual, narcissistic, and aggressive aims to manipulate, dominate, and control.<sup>1</sup>

Between 25% and 50% of American women have experienced some aspect of childhood sexual abuse or sexual victimization. One of six rape victims is a girl <12 years old. The short-term and long-term impact on the survivor can be devastating. The sexually abused child is violated in her development, has lost her rights of protection and inner sense of safety, is denied a sense of entitlement, is stripped of her self-esteem, and is often permeated with guilt, secrecy, and a constant overlay of confusion and fear.<sup>1</sup>

We live in a violent world. We are constantly exposed to man's inhumanity to man on a grand scale, whether it be Rwanda, the Congo, East Timor, or the Balkans.

In our local communities we are constantly exposed to the panoply of family violence with its components of woman battering, rape, incest, elder abuse, and sibling abuse. These crimes compete in the daily news with the nonremitting gay bashing, the overt manifestations of racial hatred, and the ever-expanding litany of anti-isms. For some of us the victims become our patients, and it is part of our professional existence. Sadly, for some of us the victims are our family and friends, and the memory becomes part of our personal lives.

Many years ago, a teacher, whose name is floating somewhere in the bottomless pit of all my lost memories, described the metamorphosis that takes place with implacable certainty in all of us through medical school and

residency—the change that occurs as we transit from lay persons to health professionals and as society imbues us with certain qualities and expectations that we eventually accept.

One manifestation of this change is our capacity as physicians to deal effectively with and accept or at least tolerate our patients' behaviors, characteristics, and even words we would never accept from friends or family. Osler used the word *aequanimitas* to describe this positive necessity in our daily work.

However, I have great difficulty dichotomizing my personal and professional selves when it comes to the horror of child sexual abuse. My mind is filled with value judgments such as vile, repugnant, vulgar, and obscene. My emotions are of disgust, anger, and rage. The residue is sadness, helplessness, and a sense of powerlessness.

These reactions make me all the more appreciative of Dr Berenson's efforts to provide objective data to help assess a child when sexual abuse is suspected.

I would ask the following questions to better understand how to integrate these data into my clinical activities:

1. Are there any clues as to the way the child verbally and nonverbally responds to the physical examination that suggest sexual abuse? I am thinking of the adult patient who "zones out" during the pelvic examination, a behavior that can be a diagnostic clue to a history of sexual abuse.

2. You chose not to include examination of the anal region. In girls, is there a relative absence of anal sexual abuse versus genital-vaginal sexual abuse?

3. It is natural and expected for children to engage in sexual behavior as part of the information-gathering process associated with "playing doctor" or "playing house."<sup>1</sup> To what extent do past injuries derived through mutual genital play, play-related trauma, or self-exploration, including putting foreign objects into the vagina, result in your findings?

4. Is this an area of gynecology in which the clinical assessment and care should be performed only by someone with special knowledge? Is it reasonable for most obstetrician-gynecologist generalists to take direct responsibility for the evaluation and diagnosis in these patients?

5. Am I correct that your data refute statements in the section on sexual abuse in The American College of Obstetricians and Gynecologists Technical Bulletin No. 201 published in January 1995 on Pediatric Gynecologic Disorders?<sup>2</sup> Specifically, "...nevertheless, the physician should be able to differentiate a normal and an altered hymen.... The hymen is normally smooth and contiguous.... When there has been severe stretch trauma to the hymen, it will retract into hymenal caruncles or remnants; this is an important sign because some children who have been sexually penetrated may never undergo surgical repair of the acute injury...."<sup>2</sup>

6. Considering your findings, are photographic atlases illustrating the results of child sexual abuse, such as those written by Chadwick et al<sup>3</sup> and Monteleone,<sup>4</sup> still clinically informative?

7. What do you anticipate will be the impact of your data on lawsuits related to allegations of child sexual abuse? Acting in the capacity of expert witness, what evidence, if any, would you accept as definitive proof of child sexual abuse?

Dr Berenson, I admire, respect, and honor you for your efforts in exploring aspects of our specialty in which there has been a relative paucity of published data and for providing us data that reflect the rigor of scientific method. Thank you for your important contribution.

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**DR LEE A. LEARMAN**, San Francisco, California. I recently reviewed the literature on adult sexual assault. Only in recent years have there been any studies comparing sexually assaulted adult women with sexually active controls, and your study has gone further than that previous work in really meticulously looking at this.

I have a question that will help me understand the true core of the findings. There was nearly a 3-fold increase in the rate of vaginal discharge among sexually abused children as compared with controls, 11% versus 4%, and that was statistically significant. The next biggest finding was that of labial agglutination, in which there was a 13% risk among abused children and only a 7% risk among those not abused. That was not statistically significant. Is it possible that there really is something there but that your study lacks the statistical power to demonstrate this?

**DR RICHARD C. BUMP**, Durham, North Carolina. My question is related to the discharge. Do you have any microbiologic data as to the basis for the discharge? Also did you note any children with evidence of human papillomavirus externally and did that differ?

**DR WILLIAM D. SCHLAFF**, Denver, Colorado. I have a question about obtaining informed consent. The challenges are obvious in obtaining informed consent in an abused child. I would like to know something about the approach you took in this study in obtaining informed consent, particularly in an abused child.

**DR NARENDER N. BHATIA**, Long Beach, California. I have two of the same questions about the analysis of discharge in a patient with sexual abuse. Also do you have any follow-up regarding psychologic assessment in a patient or any of the controls who went through an examination and quite a session of photographs? I wonder how the psychologic profiles looked after a few months. Was the assessment itself considered abuse?

**DR SHERMAN ELIAS**, Chicago, Illinois. This was an important issue to address before our Society.

I have a question regarding the scoring system that you used. You said that one needed a score of  $\geq 51$  to define sexual abuse. Could you describe this system? For example, how many items were included and was there any weighting of any of the numbers?

**DR KAMRAN S. MOGHISSI**, Detroit, Michigan. Dr Berenson, you did not refer to the absence or presence of any sexually transmitted disease. We have seen children as young as 6 or 7 years old with severe pelvic inflammatory disease. Did you find any evidence of sexually transmitted diseases or a history of such findings?

**DR BERENSON** (Closing). First, I will address Dr Chez's questions. He asked whether there were any clues in the way children verbally or nonverbally respond to the physical examination. I am not aware of any studies that have systematically looked at this, so I can only report anecdotally what we experienced in our study. Overall, the abused children tended to take longer to be examined, tended to have lower trust levels during the examination, and more often requested breaks to go to the bathroom during the examination compared with the nonabused children.

Regarding the anal region, Hobbs and Wynne<sup>1</sup> from England did publish data on anal abuse and found that anal penetration is a problem among both boys and girls. In our study we did ask about anal abuse, but only eight children in the abused group reported anal penetration. Therefore we did not have sufficient power to compare perianal findings between the two groups.

We did ask about foreign objects in the vagina. If there was a history of foreign objects in the vagina, the child could not be included as a control. Among abused children, if insertion of a foreign object was the only type of abuse, they were not included. There were two children in whom a foreign object was placed into the vagina by someone, but there was not a significant history of digital or penile penetration. These children were not included in the abused group. So we did attempt to eliminate these children from our study population.

Self-exploration was not asked about. However, in my opinion it is unlikely that self-exploration would be traumatic enough that it would cause damage to the hymen because that should induce pain.

Whether this examination should be performed by someone with special knowledge in this area is a very good question. I think all clinicians need to be aware that this is a forensic examination; and if you perform this examination, you should be completely prepared to go to court and testify about your findings. You will be asked in the courtroom about the number of examinations that you have performed, and your findings may be somewhat less accepted if it is the first time you have done such an examination.

However, sometimes there is not an alternative available. An expert is not available, and a primary provider goes ahead and does the examination. In these cases I would recommend that photographs be taken, whether

you do or do not think the findings are normal, so they can be reviewed by an expert at a later date.

Regarding the statements in the American College of Obstetricians and Gynecologists Technical Bulletin, I think the findings of this study, as well as other studies, do refute some of the statements made in that bulletin. For example, the statement that the hymen is usually smooth is not entirely correct. In our study  $>50\%$  of children in the nonabused group had a bump or a notch somewhere on the hymenal rim. So I am not sure whether the hymen would be classified as smooth. Regarding how many children have hymenal caruncles, I can say with certainty that this is rarely a result of sexual abuse because we did not find an injury this severe in a single child in our abused group.

Regarding whether the physician should be able to differentiate a normal from an abnormal hymen, I think that this is possible if you are confronted with one of the findings we felt was abnormal in this study, such as a vulvar laceration, a perforation, a transection, or a deep notch of the hymen. However, in many cases we know that the hymens of abused and nonabused children appear very similar.

The atlases discussed are 5 to 10 years old. This is a rapidly changing field, and new data are constantly coming out. Many of the statements made in these atlases are not up to date. They do show some excellent examples of hymenal transection and other abnormalities, so they are still useful.

Regarding what would be considered definitive evidence of prior trauma, I mentioned a laceration of the vulva, a hymenal transection, a deep notch, or a perforation. In the white children in our study there was an increased prevalence of vaginal discharge and partial agglutination. However, these were also seen in nonabused children, so they could not be considered pathognomonic for abuse but perhaps are suggestive of abuse.

Dr Learman asked whether we had the power to examine labial agglutination. Because this study was funded by the National Institutes of Health, we were required to do a power analysis before initiation of the study. We also did power analyses after the study to ensure that we had adequate power, and we did have adequate power.

In our study labial agglutination did appear to be suggestive of abuse among white children. We did not find it to be suggestive of abuse when we looked at all three ethnic groups together.

Dr Bump asked about microbiologic data on the discharge. We did not perform microbiologic studies on the discharge itself. This was a visual finding on the slides.

Dr Schlaff asked about obtaining informed consent, and I wish to make a statement about what we did regarding that issue, because I did not include it in the presentation. We were required by the institutional review board not only to have written informed consent from the parent but also verbal assent from the child. So before we took any photographs, we had to ask the child whether she would agree to do this study and agree to the examination.



In addition, because this examination was being done for research only, the children in the nonabused group had the capability to refuse to participate or to stop the examination at any point during the study. We did have a few children who thought they wanted to do the study but then became upset about being on the table, and we stopped the study at that point. The abused children were required to undergo this examination as part of the legal case, but with regard to the photographs we still had to have verbal assent from the child.

Dr Bhatia asked about the psychologic impact of the examination on the controls. I do not have any data from a few months after the examination as he requested, but I do have data from the time period immediately after the examination. The University of Texas Medical Branch Institutional Review Board asked that we conduct an exit interview on every child at our institution who underwent this study. Immediately after the examination,

95% of the children said they would come back and do a similar type of study in the future. Five percent said that they would not. Among the parents, 96% said they would participate again. One percent said they would not, and 3% were not sure.

Dr Moghissi asked about the presence or absence of a sexually transmitted disease. We did look for sexually transmitted diseases and included these in the scoring system. Dr Elias asked about the scoring system. The scoring system is included in the manuscript together with the weighting of the different items.

There were 8 items, and they included questions such as whether the child reported pain at the time of the abuse and whether she reported bleeding.

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