

Neisseria gonorrhoea Infections in Girls Younger Than 12 Years of Age Evaluated for Vaginitis

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ABSTRACT. *Objective.* This study examined the prevalence of gonorrhea in girls <12 years of age who presented with vaginitis and in whom sexual abuse was not suspected.

Design. A prospective, consecutive patient series was performed in a pediatric emergency department with 90 000 visits per year and in 2 affiliated pediatric continuity clinics. All girls (Tanner I or II) between the ages of 12 months and 12 years, presenting with a chief complaint of vaginal discharge, burning, pain, or itching, were enrolled ($n = 93$). Patients were excluded ($n = 6$) if there was a history of sexual abuse. The presence or absence of vaginal discharge, vaginal erythema, or trauma was recorded. Physicians were instructed to collect cultures for *Neisseria gonorrhoea* (GC), *Chlamydia trachomatis*, and bacteria/yeast. Wet prep, urinalysis, urine culture, serum rapid plasma reagin, and fungal culture were obtained at the physician's discretion.

Results. Of the girls, 43 had a vaginal discharge on examination. Of these girls, 4 (9%) had GC, 9 (26%) had group A, B, or F streptococcus and 1 had *Staphylococcus aureus*. Of the girls, 44 had no discharge on examination. In this group, 3 had streptococcus infection and 2 had *Candida albicans*. Both children with *C albicans* had been treated recently with systemic antibiotics. Those girls with a vaginal discharge on examination had a microbial etiology significantly more often than did those without discharge. All of the girls with infection were Tanner I on genital examination.

Conclusions. The prevalence of unsuspected GC infection was high and emphasizes the importance of culturing Tanner I girls for GC when they have a vaginal discharge along with routine bacterial cultures. Testing and/or treating for *C albicans* should be considered when there has been recent antibiotic use. Girls with vaginal complaints but without vaginal discharge may have a bacterial infection, but such diagnoses occur less frequently than with girls who have a discharge. *Pediatrics* 1999;104(6). URL: <http://www.pediatrics.org/cgi/content/full/104/6/e72>; *Neisseria gonorrhoea, sexual abuse, vaginitis, Chlamydia trachomatis.*

ABBREVIATIONS. GC, *Neisseria gonorrhoea*; ED, emergency department.

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Vaginitis is a common complaint of young girls. It is often attributed to various nonspecific causes, such as bubble bath, poor hygiene, local irritation, or infection with yeast. In many practice settings, treatment is prescribed for the vaginitis without searching for a specific bacterial etiology, such as sexually transmitted infections.

Previous work at our institution sensitized our group about the prevalence of *Neisseria gonorrhoea* (GC) in girls with no presenting history of sexual abuse. A 1993 retrospective study of sexually transmitted diseases among sexually abused girls¹ found that most of the girls who had been diagnosed with gonococcal vaginitis had presented initially for evaluation of vaginitis and not for alleged sexual abuse. At the time of the evaluation, neither the physician nor the child's parent suspected sexual abuse. However, in the emergency department (ED), it was common practice to include vaginal gonorrhea cultures for the evaluation of purulent vaginal discharge in prepubertal girls, and many of the GC culture results were positive.

This prospective study was designed to determine the prevalence of gonorrhea in girls <12 years of age who presented with vaginitis and in whom sexual abuse was not suspected. This question has not been answered in the pediatric literature. Data were collected on the prevalence of other treatable pathogens in this group as well.

METHODS

A prospective, consecutive patient series was performed in the pediatric ED of Cincinnati's Children's Hospital Medical Center, and in 2 affiliated pediatric continuity clinics. All girls (Tanner I or II) between 12 months and 12 years of age, presenting with a chief complaint of vaginal discharge, pain, erythema, or itching, were enrolled. Patient selection was consecutive, and patients were excluded if a history of sexual abuse was obtained during the evaluation. A study form was attached to each eligible patient's chart on entering the ED that described the enrollment requirements. Patients were interviewed using the study form and examined by a pediatric house officer or an attending pediatrician. The examining physician was instructed to gather information for the study, including a description of the vaginitis and/or discharge, any recent use of antibiotics, any history or concern of sexual abuse, whether any other children in the home had been sexually abused or had been diagnosed with a sexually transmitted infection, whether bubble baths were taken by the

patient, whether the patient wore nylon underwear, and whether the patient wiped from back to front after using the toilet. Responses were recorded onto the study sheet. The examining physician recorded the genital examination findings onto the study form including a description of vaginal discharge if present, the presence of vaginal erythema, and any recognizable vaginal trauma. Physicians were instructed to collect cultures for GC, *Chlamydia trachomatis*, and bacteria/yeast. Wet prep, urinalysis, urine culture, serum rapid plasma reagin, and fungal culture were obtained at the physician's discretion. An attending pediatric emergency medicine faculty or senior pediatric emergency medicine fellow was on site at all times. General pediatric attending physicians supervised and saw all clinic patients. Signs of subtle vaginal or hymen injury were not recorded in this study because some of the examining physicians lacked expertise in this area.

All specimens were sent to the Children's Hospital Medical Center microbiology lab for processing. Gonorrhea cultures were obtained from the vagina of patients using a type I Calgiswab (Allegiance Scientific Products, Obetz, OH). The physician inoculated a plate with Thayer-Martin media (Allegiance Scientific Products), which had been warmed to room temperature. Specimens were transported to the microbiology lab within 60 minutes of inoculation. The microbiology lab confirmed positive GC culture results using a biochemical test, an agglutination test, and a deoxyribonucleic acid probe. The cultures then were exposed to oxygen to confirm that the organisms were anaerobes. *C trachomatis* specimens were collected from the vaginal wall using a type I calgiswab and transported on ice in chlamydia transport media immediately. Specimens were processed using a spin application technique. Three tenths of a milliliter of specimen was inoculated onto McCoy cell plates (Allegiance Scientific Products), spun at 2700 rpm for 60 minutes, and incubated for 48 hours. Specimens were stained using monoclonal antibodies. Vaginal bacterial/yeast cultures were obtained from the vaginal wall using Culturette II (Allegiance Scientific Products). Identification of *Staphylococcus aureus*, streptococcus (groups A, B, and F), and yeast were reported, along with pure growths of *Shigella* or *Gardnerella vaginalis*. The Children's Hospital Medi-

cal Center hematology lab processed wet prep specimens. Motile trichomonads were reported if seen. The physicians could elect to send separate fungal cultures in addition to the bacterial/yeast culture.

The hospital child abuse team evaluated all children who were diagnosed with a sexually transmitted disease. A report to the Department of Human Services was made if abuse was diagnosed or suspected. The institutional review board of the Children's Hospital approved this study.

RESULTS

A total of 93 girls were enrolled in the study but 6 were excluded either because the parent or the physician had concerns of possible sexual abuse or because the patient failed to meet enrollment criteria (chief complaint other than vaginitis). Data from the remaining 87 girls were analyzed. On examination, 74 girls (80%) were Tanner I, and 13 girls (20%) were Tanner II. Of the girls, 55 were black, and 32 were white. Of the girls, 74 were evaluated in the ED, and 13 were evaluated at a continuity clinic. The average age of girls enrolled was 5.9 years and 49% of the enrolled girls had a discharge on examination. Private insurance was the method of payment for 31% of the patients. All girls (87) were cultured for both GC and chlamydia. Of the ED patients, 62 (84%) and of the clinic patients, 13 (100%) were cultured for aerobic bacteria/yeast (total of 85%). Table 1 lists the number and percentage of patients who were tested, the number of positive tests, the pathogen prevalence, and the percentage of girls with discharge for each infection. A total of 18 girls (21%) were diagnosed with a microbiologic cause of their vaginitis. One patient was diagnosed with both GC and group A streptococcus. GC was diagnosed only in the ED group. There was no statistical difference between the ED patients and the clinic patients in the prevalence of bacterial infections ($P = .4$; Fisher's exact test).

Of the girls enrolled in the study, 43 (50%) had a vaginal discharge on examination, 33 were Tanner I and 10 were Tanner II. Of the 43, 37 (86%) presented with a chief complaint of vaginal discharge, 28 Tanner I, and 9 Tanner II. The other 6 complained of itching, pain, erythema, dysuria, or frequency. Of these 43 girls, 13 (30%) were diagnosed with vaginal

TABLE 1. Number of Tests Obtained, Prevalence of Infections, and Presence of Discharge on Examination for All Study Patients

Test	Number of Patients Tested	Number of Positive Test Results	Prevalence (in Those Tested)	Number Patients With Discharge	Number of Infections Diagnosed in the ED	Number of Infections Diagnosed in the Clinic
GC culture	87 (100%)	4	4.6%	4 (100%)	4	0
Chlamydia culture	87 (100%)	0				
Bacterial (aerobic) culture	74 (85%)	13	17.5%	10 (77%)	10	3
Yeast found on bacterial culture	74 (85%)	2	2.7%	0	2	0
Wet prep	31 (36%)	0				
Urine analysis for <i>Trichomonas</i>	56 (64%)	0				
Urine culture	50 (58%)	0				
Serum RPR	4 (5%)	0				
Fungal culture	0					
Total		19/87	22%			

infections including GC (4), streptococcus groups A, B, and F (9), and *S aureus* (1). One girl had both GC and streptococcal organisms cultured. All 13 girls with infection were Tanner I on vaginal examination. Table 2 lists the infectious agents diagnosed in Tanner I patients who had a vaginal discharge on examination, the percentage of Tanner I patients who were tested, the number of positive tests, and the pathogen's prevalence.

Of the girls enrolled in the study, 44 (50%) had no vaginal discharge when examined although just less than half of them (21) presented with vaginal discharge as their chief complaint. Of these girls, 3 were Tanner II and 41 were Tanner I. Chief complaints among the other 23 girls in this group included (in order of frequency): itching, dysuria, pain, enuresis, vaginal soreness, and erythema. Of these 44 girls, 33 (75%) had vaginal erythema on examination. The other 11 had normal vaginal examinations. Of these girls, 5 were diagnosed with vaginal infections attributable to: streptococcus groups A and B (3) and *C albicans* (2). All 5 girls with vaginal infection were Tanner I. Both girls with yeast infections had been treated recently with antibiotics. Table 3 lists the infectious agents diagnosed in Tanner I patients without a vaginal discharge on examination, the percentage of Tanner I patients who were tested, the number of positive test results, and the pathogen's prevalence.

The girls with a vaginal discharge on examination had a microbial infection diagnosed significantly more often than those girls without discharge (relative risk [95% confidence interval]: 3.66 [1.31–10.26]; $P < .01$) and bacterial infections were diagnosed only in those girls who were Tanner I. GC was diagnosed only in those Tanner I girls with discharge on examination. *Candida* vaginitis was diagnosed only in the 2 girls who had recently been treated with antibiotics. Group A streptococcus was the most common pathogen diagnosed. Table 4 summarizes the culture results, chief complaints and the examination findings of the 18 girls with identified vaginal infections. Table 5 summarizes the examination findings and symptoms of the 4 girls diagnosed with gonorrhea. Figure 1 graphs the prevalence of each pathogen in Tanner I girls.

DISCUSSION

Our study demonstrates that vaginal discharge in prepubertal girls is caused frequently by bacterial infection. Specifically, 30% of bacterial infections identified in this group of girls were attributable to a

TABLE 2. Tanner I Girls With Vaginal Discharge on Examination: Prevalence of Infection Was Higher Compared to the Girls Without Discharge

Organism	Number of Patients Tested	Number of Positive Test Results	Prevalence (in Those Tested)
GC	33 (100%)	4	12%
Streptococcus (groups A, B, and F)	29 (88%)	9	31%
<i>S aureus</i>	29 (88%)	1	3%
Total		14/33	42%

TABLE 3. Tanner II Girls Without Vaginal Discharge on Examination: Prevalence of Infections Was Lower Compared to Girls With Discharge

Test	Number of Patients Tested	Number of Positive Test Results	Prevalence (in Those Tested)
GC	41 (100%)	0	0%
Streptococcus (groups A and B)	38 (93%)	3	3%
<i>C albicans</i>	23 (52%)	2	9%
Total		5/41	12%

sexually transmitted organism, GC. Because this infection is virtually diagnostic of sexual abuse, it is critical to consider this diagnosis before instituting antibiotics, as we did in this study. Although several cases of asymptomatic gonorrhea infection have been reported,² our results confirm that the incidence of this infection is very low in girls without discharge.^{3–5}

Infections from streptococcus, particularly streptococcus pyogenes, were the most common infection diagnosed and should respond to appropriate oral antibiotic therapy. Much has been written on the presentation and treatment of pediatric streptococcus vulvovaginitis.^{6–8}

Yeast infections are uncommon in young girls. Neither of the 2 girls in this study who were diagnosed with *Candida* infection had any vaginal discharge on examination. One presented with the complaint of discharge but was found to have a normal genital examination, and the other complained of vaginal pain and had mild vaginal erythema on examination. The symptoms of both girls resolved spontaneously without antifungal treatment. *Candida* has been isolated from the vagina in asymptomatic girls,⁹ and it is not clear if the *Candida* isolated from these 2 girls was a causative agent of their complaints.

A complaint of vaginitis was not an indication of chlamydia infection in our study. None of the girls tested positive for this organism. In addition, no cases of *Trichomonas* were identified among the girls tested. Nevertheless, it seems prudent to obtain a wet prep analysis in girls with discharge because *Trichomonas* has been shown to be a cause of vaginitis in prepubertal girls.

Other studies have examined the bacteriology of vaginitis in young girls and our results are similar to those found by Paradise et al.¹⁰ In the study by Paradise et al, 54 premenarcheal girls with symptoms of vulvovaginitis were examined. Bacterial infection was diagnosed in ~50% of the girls with discharge on examination but in none of the girls without discharge. Four girls were diagnosed with GC (15% of the girls with discharge). No cases of prepubertal *Candida* were diagnosed in her study. Pierce and Hart¹¹ studied prospectively 200 girls presenting to the ED with genital discharge, irritation, pain, or redness. Their results differed significantly from our study in that there were no sexually transmitted infections isolated. Jones¹² studied 42 premenarcheal girls who complained of vulvovaginitis or

TABLE 4. Culture Results, Ages, Chief Complaints, and Examination Findings of All Girls With Identified Vaginal Infections

Culture Results	Number of Girls	Ages in Years	Chief Complaint	Vaginal Examination Findings	Recent Antibiotic Use
GC	3	2.7, 3.5, 8.3	Vaginal discharge	Discharge	None
GC and group A streptococcus	1	2.5	Vaginal discharge	Discharge	None
Group A streptococcus (strep pyogenes)	6	2.6, 4.1, 5.4, 5.8, 6.2, 7.4	Vaginal discharge	Discharge	None
	1	3.5	Vaginal discharge	Erythema	None
	1	8.0	Itching	Normal	None
Group B streptococcus	1	9.0	Vaginal discharge	Discharge	None
	1	2.3	Dysuria, vaginal pain	Erythema	None
Group F streptococcus	1	2.9	Vaginal discharge	Discharge	None
<i>S aureus</i>	1	2.3	Vaginal discharge	Discharge	None
<i>C albicans</i>	1	9.6	Vaginal pain	Erythema	Amoxicillin
	1	4.8	Vaginal discharge	Normal	Augmentin

TABLE 5. Examination Findings and Symptoms of Girls With Gonorrhea

Age (Years)	Color and Amount of Discharge	Vaginal Trauma Seen on Examination by MD	Other Vaginal Symptoms
2.7	Green, purulent	No	
2.5	Yellow, purulent	No	
8.3	White, purulent	No	Itching, dysuria
3.5	Green, purulent	No	

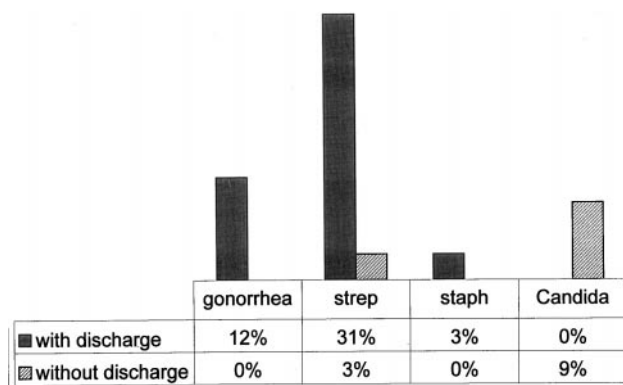


Fig 1. The prevalence of pathogens in Tanner I girls.

vaginal discharge in a general medicine practice and found results unlike our results. In this study of Jones, 25% of the girls were diagnosed with streptococcus pyogenes (group A β -hemolytic streptococcus) infection, but no sexually transmitted infections and no *Candida* infections were found. Pena et al¹³ obtained cultures from 262 premenarcheal girls with vaginitis. In this study, unlike our study, 3% of the cases were attributed to streptococcus pyogenes, 1.5% *C albicans* but only 1 case (.4%) of GC. We are unable to explain why in 3 of the studies cited above no sexually transmitted infections were diagnosed, whereas in the study by Paradise, the rate of GC infections was similar to our study. Differences in the rates of GC may be attributable to the different prevalence of GC in each community, specimen transport methods, specimen collection differences, or differences in study populations. In clinical environments where sexual abuse is seen, it would be reasonable to culture for gonococcal vaginitis in girls with vaginitis.

Limitations

Our study has several limitations. First, although we attempted to enroll patients consecutively into the study who presented with a chief complaint of vaginal discharge, pain, erythema, or itching, some children with these complaints may have been missed. Second, no attempt was made to diagnosis physiologic discharge in the Tanner II girls. Third, although no clue cells were found on the yeast and clue cell stains from the 35 girls who had this test performed, cases of bacterial vaginosis may have been missed because whiff testing of vaginal discharge was not performed. Fourth, some girls with a bacterial infection or infection with *Trichomonas* may have been missed because bacterial and wet prep testing was not performed in all patients. The factors that influenced the examining physicians to culture for bacteria/yeast are not known. Discharge did not seem to be a factor however. Of the 43 girls with discharge, 36 were cultured for bacteria/yeast, whereas 38 of 44 girls without discharge were cultured. Of the girls who presented with the chief complaint of discharge, 83% (48/58) were cultured for bacteria/yeast, compared with 90% (26/29) of the girls who presented with other chief complaints. However, the presence of discharge doubled the likelihood that a wet prep would be sent. Wet preps were obtained in 22 of the 43 girls (51%) with discharge and in 10 of the 44 girls (23%) without.

CONCLUSIONS

The Tanner I girls who had a vaginal discharge on examination had a microbial infection diagnosed significantly more often than the girls without a discharge. In this population of girls presenting to the ED with a vaginal discharge on examination, the prevalence of unsuspected gonorrhea was high. We recommend that cultures for bacteria and GC be obtained in all Tanner I girls who have a vaginal discharge on examination, even if the parent or examining physician lack any concern about sexual abuse. Although we found that bacterial infection was less common in girls seen in an outpatient clinic, compared with girls seen in an ED, no statistically significant difference was found. The prevalence of vaginal fungal infection in prepubertal girls is low and presumptive therapy for fungal infection should

be limited. In this study, both of the girls who cultured positive for *C albicans* had resolution of their symptoms without antifungal therapy. Tanner I girls without vaginal discharge are less likely to have a GC infection.

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