Vulvovaginitis is the most common gynaecological problem in prepubertal girls. Factors that explain the increased susceptibility of children to vulvovaginitis include: the close anatomical proximity of the rectum; lack of labial fat pads and pubic hair; small labia minora; thin and delicate vulvar skin; thin, atrophic, anoestrogenic vaginal mucosa; and children’s tendency to have poor local hygiene and to explore their bodies. Most cases of vulvovaginitis are of non-specific aetiology. However, in some patients the symptoms are caused by infections with specific bacterial pathogens.

The present retrospective report summarises the clinical features, results of bacterial cultures, and findings in microscopic examination of vaginal secretions from 80 prepubertal girls, aged 2–12 years, with vulvovaginitis. Subjects with suspected sexual abuse were excluded.

**PATIENTS AND METHODS**

Between January 1995 and December 1997, 80 prepubertal girls (Tanner stage I) who were not suspected of being sexually abused were seen in the outpatient clinic for paediatric and adolescent gynaecology of the university children’s hospital of Zurich because of vulvovaginitis. Pertinent clinical data were recorded and physical examination performed. Samples of vaginal secretions were obtained for evaluation under the light microscope during the patient’s visit and for bacterial cultures and Gram film. Secretions were collected using a sterile newborn suction catheter, 2–3 cm of which were carefully inserted into the vagina. Secretions were cultured onto the following agar plates: sheep’s blood agar, heated blood agar, coagulase negative staphylococci; and Sabouraud’s agar.

**RESULTS**

The age of the girls ranged from 2 to 12 years (fig 1). Table 1 summarises the clinical features of the patients. Vaginal discharge was the most common symptom (92%). Table 2 summarises microbiological findings. Bacterial pathogens were isolated in vaginal secretions of 29 (36%) girls, four cases having a mixed infection with two bacteria. Isolated pathogens included group A β-haemolytic streptococcus, Pseudomonas aeruginosa, Proteus species, Pseudomonas species) known to occur in healthy prepubertal girls not considered the cause of illness. Candida was not isolated in any of the patients. A total of 26 patients were treated with systemic antibiotics: 25 of the 29 with growth of pathogenic bacteria and an additional patient without growth. The four patients with bacterial isolation. Eighty girls with vulvovaginitis were studied. A total of 29 patients had growth of one or more pathogens. Since four were asymptomatic by the time culture results became known, only 25 of these 29 patients received systemic antimicrobial treatment.

**Table 1** Clinical features of 80 girls with vulvovaginitis

<table>
<thead>
<tr>
<th>Features</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vaginal discharge</td>
<td>74 (92%)</td>
</tr>
<tr>
<td>Itching</td>
<td>36 (45%)</td>
</tr>
<tr>
<td>Redness</td>
<td>24 (30%)</td>
</tr>
<tr>
<td>Dysuria</td>
<td>15 (19%)</td>
</tr>
<tr>
<td>Pain</td>
<td>6 (8%)</td>
</tr>
<tr>
<td>Bleeding</td>
<td>4 (5%)</td>
</tr>
</tbody>
</table>

**Table 2** Bacteria isolated from vaginal secretions of girls with vulvovaginitis

<table>
<thead>
<tr>
<th>Organisms cultured</th>
<th>No. of positive cultures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pathogens</td>
<td></td>
</tr>
<tr>
<td>Group A β-haemolytic streptococcus</td>
<td>17</td>
</tr>
<tr>
<td>H influenzae type b</td>
<td>2</td>
</tr>
<tr>
<td>H influenzae non-b</td>
<td>5</td>
</tr>
<tr>
<td>Klebsiella pneumoniae</td>
<td>1</td>
</tr>
<tr>
<td>Shigella flexneri</td>
<td>1</td>
</tr>
<tr>
<td>Staphylococcus aureus*</td>
<td>7 (4 in mixed cultures)</td>
</tr>
<tr>
<td>Non-pathogens</td>
<td></td>
</tr>
<tr>
<td>Coagulase negative staphylococci</td>
<td>7</td>
</tr>
<tr>
<td>Enterococcus spp.</td>
<td>4</td>
</tr>
<tr>
<td>Escherichia coli</td>
<td>4</td>
</tr>
<tr>
<td>Viridans streptococcus</td>
<td>4</td>
</tr>
<tr>
<td>Corynebacterium</td>
<td>3</td>
</tr>
<tr>
<td>Pseudomonas aeruginosa</td>
<td>3</td>
</tr>
<tr>
<td>Proteus mirabilis</td>
<td>1</td>
</tr>
</tbody>
</table>

*The role of Staphylococcus aureus as a pathogen is questionable [see text]."
Vulvovaginitis in prepubertal girls

DISCUSSION

When evaluating vulvovaginitis it is very important to realise that pubertal development and its hormonal influence is more important than the chronological age. This study was limited to prepubertal girls (Tanner stage I) as opposed to other studies in which patients were categorised according to age or occurrence of menarche. Patients were not routinely screened for gonorrhoea, Chlamydia trachomatis, or Trichomonas. These sexually transmitted pathogens were sought only in cases of suspected sexual abuse, all of which were excluded from the study. Since sexual abuse is not always disclosed in this population, this is a flaw with the study.

A major question in the management of vulvovaginitis is whether bacteria isolated from the patients’ vaginal secretions are the actual cause of the symptoms or are part of the normal flora. A number of studies attempted to define the normal flora of the vagina by performing cultures in asymptomatic subjects, with variable results. Bacteria which are not sexually transmitted and are generally considered pathogens include: group A β-haemolytic streptococcus (Streptococcus pyogenes), Haemophilus influenzae, Staphylococcus aureus, Moraxella catarrhalis, Streptococcus pneumoniae, Neisseria meningitidis, Shigella, and Verminia enterolitica. A significant weakness of this study is that there is no control group, either simultaneously or using follow up cultures in the same patients well past treatment without symptoms. In the current study the isolation of bacterial pathogen was found in 29 of 80 girls (36%). Other studies have reported lower rates. A possible explanation is that the patients were seen in a subspecialty clinic and not in a primary care setting. It is interesting to note that in a previous study from 1992, in which 160 girls presenting with vulvovaginitis between July 1987 and March 1990 had a bacterial swab, the most frequently isolated pathogen was Haemophilus influenzae (types not specified) which occurred in 22 patients.

In the current study the isolation of group A β-haemolytic streptococcus by far exceeded that of Haemophilus influenzae, the former being isolated in 17 cases and the latter only in seven, two of which were Haemophilus influenzae type b. A plausible explanation is the introduction of vaccination against Haemophilus influenzae type b: purified polyribosylribitol phosphate polysaccharide (PRP) was introduced in 1985, with limited immunogenicity in infants and young children, followed by polyribosylribitol phosphate-diphtheria toxoid conjugate vaccine (PRP-D) in 1987, and Haemophilus b oligosaccharide conjugate vaccine (HbOC) in 1988. Staphylococcus aureus was isolated in seven patients, in four as coinfection with another pathogen and in three as a single pathogen. It is interesting to note that all three patients infected with Staphylococcus aureus alone were asymptomatic when culture results were known and did not require systemic antimicrobial treatment. It follows that when girls suffering from vulvovaginitis have isolated growth of Staphylococcus aureus in vaginal secretions it is important to inquire about persistence of symptoms before prescribing antimicrobial treatment.

Group A β-haemolytic streptococcus was isolated in 21% of the girls. The Nottingham Public Health Laboratory isolated this organism in only 11% of vaginal swabs received from children aged less than 12 years. The pubertal stage of the girls and the indication for examination were not specified. In a study of girls aged 1–15 years with vulvovaginitis, swabs were performed and cultured. Group A β-haemolytic streptococcus was found in 18% of patients. In the current study patients with group A β-haemolytic streptococcus vulvovaginitis were among the older prepubertal girls, in accordance with the fact that streptococcal pharyngitis is most common among school age children. In temperate climates streptococcal pharyngitis occurs more frequently in the late autumn, winter, and spring, and impetigo in warm seasons. Therefore, the fact that vulvovaginitis caused by group A β-haemolytic streptococcus occurred all year round suggests that both serotypes...
causing pharyngitis and those causing impetigo were involved. Two other studies also suggest that infections arise from a previous respiratory or skin source,15 17 though both show a winter predominance. Approximately half of the patients had a personal or family history of pharyngitis. Vulvovaginitis caused by group A β-haemolytic streptococcus occurs typically in prepubertal girls and rarely in postpubertal patients. During the period studied, 47 pubescent patients with vulvovaginitis were seen in our outpatient clinic; in all cases bacterial cultures were performed. Group A β-haemolytic streptococcus was only found in two girls, aged 10 and 13 years, with pubertal Tanner stage II.

We routinely examine vaginal secretions of patients with vulvovaginitis under light microscope during the patient’s visit. The results of this study suggest that finding leucocytes does not necessarily imply the presence of bacterial pathogens, but when leucocytes are absent such an infection is unlikely. We are not aware of other reports concerning this observation.

The role of Candida albicans as a cause of vulvovaginitis in prepubertal girls is controversial. In some studies it was found in asymptomatic girls and in others as a cause of symptoms.10 12 In this study Candida albicans was not isolated in any of the patients.

Another known specific cause of vulvovaginitis is pinworms (Enterobius vermicularis). These should be considered in girls whose major symptom is perineal pruritus, especially at night. Our past experience has shown that attempting to collect eggs using a Sellotape slide test is difficult for the parents and has a relatively low yield. Moreover, we have had patients with several negative tests who in a follow up clinical examination showed the typical thread-like worm in the vagina or anus. We therefore do not search for pinworms and in cases of clinical features suggesting infestation with them, empirically treat the patients with a single dose of 100 mg mebendazole, repeated two weeks later.

Vaginal foreign bodies cause an intense inflammation, resulting in vaginal bleeding and foul smelling, blood stained vaginal discharge. These cases were not included in the study.

Girls suffering from vulvovaginitis not caused by a specific pathogen were treated with hygienic measures: avoiding tightly fitting clothing or other irritants like harsh soaps to the vulva, front to back wiping after using the toilet, sitz baths, protective ointments.

In future studies a control group should be included and all subjects screened for Chlamydia, gonorrhoea, and Trichomonas.

Conclusion
In prepubertal girls presenting with vulvovaginitis, vaginal secretions should be obtained for examination under the light microscope during the patient’s visit and for microbiological investigation. The presence of leucocytes increases the likelihood of finding bacterial pathogens which require specific treatment. In this study a bacterial pathogen was found in 36% of the cases, the most frequent being group A β-haemolytic streptococcus, probably from both respiratory and skin sources.

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