Vulvovaginitis is an inflammation of the vulva and vaginal tissues. Signs and symptoms include irritation and erythema of the vulva, vaginal discharge, soreness, itching, dysuria, excoriation of the area, and bleeding. It is one of the more common gynecological problems among prepubertal girls. In this review, we address methods of evaluation and physical findings in the prepubescent child. We will describe the causes of vulvovaginitis, which include physical, chemical, or infectious agents, and will discuss diagnostic testing and review the most common bacterial pathogens isolated from symptomatic prepubertal girls. This article will also review management strategies of improved hygiene and sitz baths and the indications for antibiotics.

**KEYWORDS** vulvovaginitis, prepubertal, group A β-hemolytic streptococcus

Vulvovaginitis is an inflammation of the vulva and vaginal tissues. Signs and symptoms include irritation and erythema of the vulva, vaginal discharge, soreness, itching, dysuria, and bleeding (Table 1) [1-4]. It is one of the most common gynecological problems seen in prepubertal girls [1,2,5-8]. Vulvovaginitis can be caused by physical, chemical, or infectious agents. Although in the past many cases were attributed to infectious agents and there was a high suspicion for sexual abuse, current data suggest that vulvovaginitis in the prepubertal girl can most often be attributed to poor hygiene or nonspecific irritant vaginitis [9-13].

Less common causes of vulvovaginitis include bacterial infections, vulvar skin disease, foreign body, sexual abuse, pinworms, medications, or anatomic anomalies. Children with persistent symptoms, as well as those with moderate to severe vulvovaginitis should have an investigation to identify these less common cases. In recent studies, bacterial infections were found in one third of young girls presenting with vulvovaginitis [9,1,2].

The aim of this article is to review the clinical factors and potential infectious causes associated with vulvovaginitis. This article will help guide practitioners in the diagnosis and treatment of this common entity.

**Pathophysiology**

There are many predisposing factors that contribute to the development of vulvovaginitis. A review of the anatomy and developmental physiology of the female genital tract is helpful to understanding these factors. In the newborn period, the level of estrogen is high from maternal transfer of hormones. As the hormone levels decrease with age, the vaginal mucosa gradually becomes atrophic, with a pH of 6.5 to 7.5 [12]. The neutral pH, atrophic mucosa, and warm and moist environment makes the vagina an excellent milieu for bacterial growth and overgrowth.

The prepubescent vulva is also susceptible to irritation. Vulvar skin is thin and delicate and lacks estrogenization, the rectum is in close anatomic proximity, the labia minora are small, and labial fat pads and pubic hair are lacking. Additional contributing factors include the poor local hygiene of a child, obesity, local irritants including some soaps and bubble baths, and tight fitting clothes and nonabsorbent underpants [1,5,10,12,14].

Pierce and Hart [13] observed poor hygiene to be the most common finding associated with vulvovaginitis. It has been reported that "nonspecific vulvovaginitis"
accounts for 25% to 75% of vulvovaginitis diagnosed in prepubertal girls treated in referral centers [4,12,13].

### Causes of Vulvovaginitis

#### Normal Flora

A major issue in the management of vulvovaginitis in prepubertal girls is distinguishing normal flora from bacterial pathogens. Table 2 lists potential pathogens and nonpathogenic bacteria found in prepubertal girls. Nonpathogens found in numerous studies include coagulase-negative staphylococci, *Enterococcus* species, *Escherichia coli*, *Viridans streptococci*, *Corynebacterium*, *Proteus mirabilis*, and *Pseudomonas aeruginosa*. Bacteroides species and lactobacilli have also been observed. Because these organisms are present in healthy prepubertal girls, their growth in culture from symptomatic girls is not diagnostic [1,2,15,16].

In the 1970s, Hammerschlag et al [15] reported the results of vaginal cultures of 100 healthy preadolescent girls and demonstrated *Candida albicans*, *Corynebacterium vaginale*, and genital mycoplasmas to be present in normal flora [15]. More specifically, Hammerschlag observed one quarter of the children were colonized with *C. albicans*, and most did not have any evidence of symptomatic vaginitis.

#### Nonspecific, Bacterial, and Other

In referral centers, ‘nonspecific’ is the microbiologic diagnosis for up to 75% of cases of vulvovaginitis in prepubertal girls [13,16,17]. One source states that in premenarchal girls, 68% of nonspecific vaginitis cases can be attributed to coliform bacteria. This form of vaginitis may have a brown to green discharge and a foul odor. The mainstay of therapy is improved perineal hygiene, using nonirritating soaps and meticulous drying of the area after bathing. No antibiotic therapy is needed [16].

Specific vulvovaginal infections in prepubertal girls are usually due to respiratory, enteric, or sexually transmitted organisms. As previously discussed, normal flora of the prepubescent vagina includes lactobacilli, diptheroids, *Staphylococcus epidermidis*, alpha streptococci, and Gram-negative enteric organisms including *E. coli* [1,2,15,16]. Bacteria generally considered pathogens in cases of symptomatic vulvovaginitis include the following: group A β-hemolytic streptococcus (*Streptococcus pyogenes*), *Haemophilus influenzae*, *Staphylococcus aureus*, *Moraxella catarrhalis*, *Streptococcus pneumoniae*, *Neisseria meningitidis*, *Shigella*, and *Yersinia entercolitica* [1,17].

In numerous studies, the most common pathogen isolated from symptomatic prepubertal girls is group A β-hemolytic streptococcus (*S. pyogenes*) [1,3,18,19]. In a retrospective study by Striker et al [1], bacterial cultures from 80 prepubertal girls aged 2 to 12 with the diagnosis of vulvovaginitis were evaluated; pathogenic bacteria were considered the cause of 36% of cases, and group A β-hemolytic streptococcus was found to be the most common of these pathogens (59%). One case report by Hansen et al [18] discusses recurrent, prepubertal vulvovaginitis secondary to presumed vaginal reinoculation from pharyngeal colonization by *S. pyogenes*. Group A β-hemolytic streptococcus is an important pathogen to consider when seeing a patient with recurrent vaginitis. A patient with a significant past history of pharyngitis, conjunctivitis, and upper respiratory tract infection presenting with signs and symptoms of vulvovaginitis should be screened for group A β-hemolytic streptococcus [18].

*H. influenzae*, although much less common, has been found to be the second most frequently isolated bacteria in several studies [8,20,21]. *H. influenzae* can be found in the nasopharynx and can be a common cause of otitis media, pneumonia, and sinusitis. Vulvovaginitis caused by group A β-hemolytic streptococci and noncapsulated *H. influenzae* is thought to be due to digital transmission from the nasopharynx to the vagina [11,15,20,21].

*Shigella* and *Salmonella* infections also need to be considered. *Shigella* vaginitis causes mucopurulent bloody discharge and is often, but not always, accompanied by a history of diarrhea either in the patient or the family [10,22].

Among prepubertal girls, organisms associated with sexual transmission may be cultured, including *Neisseria gonorrhoeae* or *Chlamydia trachomatis*. The literature

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**Table 1** Clinical features of vulvovaginitis.

- Redness
- Soreness
- Itching
- Vaginal discharge
- Dysuria
- Bleeding inflammation

**Table 2** Bacteria isolated from cultures in prepubertal females.

<table>
<thead>
<tr>
<th>Pathogens</th>
<th>Nonpathogens</th>
</tr>
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<tbody>
<tr>
<td><em>Streptococcus pyogenes</em></td>
<td><em>Enterococcus species</em></td>
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<tr>
<td><em>Hemophilus influenzae</em></td>
<td><em>Coagulase-negative staphylococci</em></td>
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<tr>
<td><em>Staphylococcus aureus</em></td>
<td><em>Escherichia coli</em></td>
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<tr>
<td><em>Streptococcus pneumoniae</em></td>
<td><em>Viridans streptococci</em></td>
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<tr>
<td><em>Moraxella catarrhalis</em></td>
<td><em>Corynebacterium</em></td>
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<tr>
<td><em>Escherichia coli</em></td>
<td><em>Proteus mirabilis</em></td>
</tr>
<tr>
<td><em>Neisseria meningitidis</em></td>
<td><em>Pseudomonas aeruginosa</em></td>
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</tbody>
</table>
clearly states that the isolation of any organism with a strong association with sexual transmission warrants further investigation [2,12,20,24]. One prospective study by Shapiro et al [24] found that as many as 30% of bacterial infections identified were attributable to N gonorrhoeae. The findings in this study are similar to those found by Paradise et al [16], where 15% of the 54 girls with vulvovaginitis in their study were found to have N gonorrhoeae. Another sexually transmitted organism that should prompt referral is Trichomonas. This organism can be identified with a wet prep analysis.

Pinworms should also be considered in the case of vaginal itching and irritation. Pinworms are common in some populations of young children and can cause vaginal discharge and irritation; perineal itching is by far the most common symptom of pinworms.

A vaginal foreign body may cause a persistent, foul-smelling bloody or brown discharge. Foreign body should be added to the differential when managing patients with recurrent vulvovaginitis and/or in cases where all other treatments have been exhausted.

Anatomic abnormalities or systemic disease should be considered, particularly in cases of chronic vulvovaginitis and when all other treatments have failed. Examples of anatomical causes of vulvovaginitis include a double vagina with fistula, ectopic ureter, Crohn disease with fistula, pelvic abscess, and vaginal tumors such as lymphangioma and sarcoma botryoides [23]. Although these entities are uncommon, they need to be explored in situations where vulvovaginitis fails to respond to the usual therapies.

**Evaluation and Laboratory Testing**

A systematic evaluation of the signs and symptoms related to vulvovaginitis is necessary for appropriate diagnosis. A history should include questions specific to hygiene and toilet habits (including direction of wiping). It is important to ask about frequency of bathing, if the child uses a tub or shower, and the types of soaps, bubble baths, or lotions the child is exposed to. Information about recent upper respiratory infections is potentially useful. The presence of other skin conditions (eczema or psoriasis) should also be addressed. It is also pertinent to ask about caretakers and to question whether there are concerns for sexual abuse [7,10,14].

For young girls, the vulva, introitus, and perineum can be inspected in the supine, frog-leg position or in the knee-chest position [10,12]. In many cases, the examination will reveal redness, excoration and/or irritation with some scant discharge. This can be managed with a discussion of hygiene and daily sitz baths; no laboratory evaluation or cultures are necessary. If the child has profuse vaginal discharge and inflammation, microbiological investigation is indicated [2]. A culture can be obtained with a culture swab that is moistened with saline and gently touched to the inner labia and posterior fossa. It is not necessary to insert the swab into the vagina [9]. A careful physical examination will help to identify systemic causes for the vulvovaginitis such as evidence of chronic illness or dermatologic disease.

For girls initially managed with conservative therapy, a more thorough evaluation should be initiated if symptoms fail to improve. If vaginitis persists even after removal of risk factors such as bubble baths and good hygiene techniques have been implemented, a follow-up examination in 2 weeks should be arranged, and a culture of vaginal secretions should be performed at that visit [2,9]. Paradise et al [16] advocate that among premenarcheal girls with complaints suggesting the presence of vulvovaginitis, the presenting clinical features and 1 specimen for bacterial and fungal culture can provide a specific diagnosis for most cases.

If nighttime pruritis is in the history, pinworms should be suspected, and the family can be instructed to apply the sticky side of tape to the perianal region in the morning to collect eggs for microscopic inspection. If the vaginal culture isolates any organism that has a strong association with sexual transmission, such as N gonorrhoeae or C trachomatis, this must prompt further investigation of child abuse and referral for social services investigation [2,12,20,24].

**Management**

Most cases of vulvovaginitis will resolve with greater attention to improved hygiene and/or daily sitz baths [6,13,16]. Hygienic measures for the prepubertal child include using cotton underpants, avoiding nylon tights, avoiding harsh soaps and lotions, front-to-back wiping, and handwashing after using the toilet. In the study by Paradise et al [16], 100% of the patients with poor hygiene as the only cause for vulvovaginitis recovered after being advised to institute improved perineal hygiene.

In cases involving recurrent episodes, abnormal vaginal discharge, or a concern for sexual abuse, further investigation is necessary, including evaluation for sexually transmitted infections. If cultures isolate N gonorrhoeae or C trachomatis, treatment with a third-generation cephalosporin (N gonorrhoeae) and a macrolide (C trachomatis) should be initiated. Girls older than 8 years should also be treated with doxycycline for 7 days [12].

Any of the bacterial pathogens listed in Table 2 should be considered as a cause for vulvovaginitis and need to be treated with antibiotics. Group A β-hemolytic streptococcus and H influenzae can be treated with amoxicillin, whereas S aureus can be treated with cephalaxin or amoxicillin-clavulanate. Candida should only be treated in young children in diapers and in school-age children who have been receiving oral antibiotics and are symptomatic. Candida infection can be treated with topical nystatin. If Shigella species are identified, trimethoprim/
sulfamethoxazole can be used for treatment [12,23]. Pinworms should be treated with mebendazole.

**Summary**

Vulvovaginitis is one of the most common gynecologic problems in prepubertal girls. Treatment of vulvovaginitis in children should be tailored to each specific case. Hygienic measures may be all that is needed for complete resolution of the vaginitis. Persistent, nonspecific vaginitis not responding to hygienic measures often needs further investigation, such as a vaginal culture. Bacterial pathogens isolated from culture should be considered as a cause for vulvovaginitis and should be treated with antibiotics. A careful and systematic approach will aid in the diagnosis and treatment of vulvovaginitis.

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**References**