13. Screening, Diagnosis and Management of Bacterial Vaginosis

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Introduction

Nonspecific vaginitis is one of the most common, but least understood, vaginal infections in women. It has been called by a number of names over the years (see **Figure 13-1**) but bacterial vaginosis (BV) may be the most appropriate term since there is growing evidence that a variety of bacteria are important in this type of infection (Holmes et al 1984).

Figure 13-1. Changes in the Name of Bacterial Vaginosis

Nonspecific Vaginitis
Haemophilis vaginalis Vaginitis
Corynebacterium vaginalae Vaginitis
Gardnerella vaginalis Vaginitis
Anaerobic Vaginosis
Bacterial Vaginosis

There are four main symptoms of vaginitis:

- Vulvar irritation
- Vulvar itching (pruritus)
- Increased vaginal discharge
- Abnormal odor

Diagnosis of vaginitis can be assisted by a pH test using Nitrazine paper, which is available in 50 cm rolls (good for 200 tests). The pH of normal vaginal fluid is usually in the range of 3.8 to 4.5. Low pH inhibits bacterial growth and decreases bacterial attachment. It is elevated by menstruation, intercourse and a lack of estrogen as occurs in menopause. An elevated pH is associated with trichomoniasis and bacterial vaginosis. In bacterial vaginosis the pH is usually above 4.7.

Lactobacillus is the predominant bacteria in normal vaginal flora, constituting about 95 percent of the bacteria in the normal vaginal flora. *Lactobacillus* modulates vaginal flora by producing lactic acid, which maintains the pH of 3.8 to 4.5 and inhibits the growth of bacteria; it produces hydrogen peroxide, which inhibits catalase negative bacteria; and it produces bacteriocidin. *Lactobacillus* also may influence bacterial adherence to vaginal epithelial cells.

In a cohort of women with bacterial vaginosis, there is a seven-fold decrease in the prevalence of facultative *Lactobacillus* and a corresponding increased prevalence of other bacteria (see **Table 13-1**). Symptomatic women with bacterial vaginosis have a 100- to 1000-fold increase in the other bacteria in Table 13-1.

Table 13-1. Flora in Bacterial Vaginosis

INCREASED PREVALENCE	INCREASED CONCENTRATION (FOLD)
G. vaginalis	17
Bacteroides	15
Peptostreptococcus	10
Mobiluncus	-
M. hominis	15
DECREASED PREVALENCE	**DECREASED CONCENTRATION (FOLD)**
Facultative *Lactobacillus*	7

Source: Hillier et al 1993; Martius et al 1988.

There are a number of factors associated with bacterial vaginosis and the corresponding change in the vaginal flora. Hormonal changes that occur with the menstrual cycle are associated with the infection. A woman's use of antibiotics, having a new sexual partner, getting an IUD or undergoing surgery also may increase her risk of getting bacterial vaginosis.

In the US, abnormal vaginal discharge leads to 10 million patients visits annually. The differential diagnosis of abnormal vaginal discharge is:

- Vaginitis/Vaginosis
- Cervicitis
- Vestibulitis
- Physiologic vaginal discharge

The symptoms of vaginitis are shown in **Table 13-2**. A scheme for the clinical diagnosis of vaginitis is shown in **Table 13-3**.

Table 13-2. Symptoms of Vaginitis

	NORMAL	CANDIDA	BV	TRICHOMONAS
Pruritus	-	+	-	+
Increased Discharge	+	-	+	+
Odor	-	-	+	+
Irritation	-	+	-	+
Yellow Discharge	-	-	-	+

Source: Eschenbach et al 1988; Wölner-Hanssen et al 1989.

Table 13-3. Clinical Diagnosis of Vaginitis

	NORMAL	CANDIDA	BV	TRICHOMONAS
pH	3.8–4.2	< 4.5	≥ 4.7	> 4.5
APPEARANCE				
Cervix	Clear	Clear	Clear	Clear
Vagina	Thick	Curdy	Thin	Thin
	Clumpy	Clumpy	Homogeneous	Frothy
	Not adherent	Adherent	Adherent	Not adherent
	White	White	Grey	Yellow
AMINE (KOH) ODOR	No	No	Yes	Probable
MICROSCOPY				
Hyphae	-	+	-	-
Clue Cells	-	-	+	-
Trichomonads	-	-	-	+
WBC	-	±	-	+
Lactobacillus	+	+	-	±
Small Bacteria	-	-	+	±

Characteristics of normal vaginal discharge:

- Vaginal fluid has
  - pH < 4.5
  - clumpy, white appearance
  - no amine odor

- Microscopy shows
  - no hyphae, clue cells, trichomonads
  - no WBCs
  - *Lactobacillus* dominates

- Exclude
  - vulvar disease
  - cervicitis

If the discharge is normal, the service provider should reassure the client and order other cultures selectively. No medication should be given, and the patient can be reexamined if necessary in 1 to 2 weeks.

Diagnosis of Bacterial Vaginosis

To make a clinical diagnosis of bacterial vaginosis, three of the following four criteria should be met (Amsel et al 1983; Eschenbach et al 1988):

- pH ≥ 4.7
- Homogeneous appearance of the discharge

- Positive amine odor with KOH
- Clue cells

Vaginal pH is a sensitive measure of bacterial vaginosis. In a 1988 study, 97 percent of women with bacterial vaginosis had a pH $\geq$ 4.7. Vaginal pH was found to be an excellent test for exclusion of the disease, in that only 3 percent of women with bacterial vaginosis had a pH < 4.7. Furthermore, 64 percent of women with a pH $\geq$ 4.7 were found to have BV (Eschenbach et al 1988).

The amine odor which is characteristic of bacterial vaginosis is created by products from anaerobic bacterial metabolism in the vaginal fluid of women with bacterial vaginosis. The elevation of pH volatizes amines from protein attachment and produces the odor.

Clue cells, which are found in bacterial vaginosis, represent bacteria attached to a vaginal epithelial cell (*G. vaginalis, Bacteroides, Mobiluncus*). Diagnosis of bacterial vaginosis is most specific when 400x power is used and when at least 20 percent of the epithelial cells are clue cells.

As opposed to other bacterial infections, in bacterial vaginosis there are no white blood cells present. It is hypothesized that anaerobes produce succinic acid, which inhibits white blood cell migration.

The frequency of bacterial vaginosis found in various groups is shown in **Table 13-4**.

Table 13-4. Frequency of Bacterial Vaginosis

POPULATION/SETTING	PERCENTAGE WITH BV
Routine Student Annual Examination	5%
Gynecology or Family Practice	15–20%
Pregnancy	15–25%
STD Clinic Population	25–40%
Pregnancy Termination Clinic	30%

Source: Hillier and Holmes 1990.

Bacterial vaginosis is an important cause of serious upper genital tract infections. Unlike other infections such as candidiasis and trichomoniasis, bacterial vaginosis gets into the upper genital tract due to the increased concentration and virulence of the causative bacteria. Some of the upper genital tract infections and problems associated with bacterial vaginosis are listed below:

- Postpartum endometritis, following both caesarean section and vaginal delivery
- Post caesarean wound infection
- Postabortion pelvic inflammatory disease
- Post abdominal hysterectomy cuff cellulitis
- Preterm delivery

Treatment

The first line therapy for bacterial vaginosis includes: 1) oral metronidazole, 500 mg twice a day for seven days, 2) intravaginal metronidazole 0.75 gel twice a day for 5 days, 3) oral clindamycin 300 mg twice a day for 7 days, and 4) 2 percent intravaginal clindamycin cream at bedtime for 7 days. The second line therapy is oral metronidazole in a 2 gm stat dose or oral amoxicillin/clavulanic acid, 500 mg three times a day for 7 days. The third line therapy is oral ampicillin/amoxicillin, oral cefadroxil, oral ofloxacin, or intravaginal triple sulfa cream. A comparison of metronidazole doses (stat dose versus 7-day regimen) shows that single dose therapy has a lower clinical cure rate (47–85%) than the 7-day course (82–89%) (Eschenbach et al 1983; Hovik et al 1983; Jerve et al 1984; Swedberg et al 1985). Side effects of therapies include candidiasis, nausea and vomiting, and vaginal irritation.

The following therapies have been shown to be ineffective: oral tetracycline/doxycycline, oral erythromycin, intravaginal betadine and intravaginal Aci-Jel. It has also been determined that douching is an ineffective therapy for bacterial vaginosis and that treatment of the male partner of the women with bacterial vaginosis is not necessary.

Conclusion

Bacterial vaginosis remains a common worldwide problem. Diagnosis can be made fairly easily by identifying clue cells in a smear and the characteristic amine odor on KOH preparation. Although the 7-day regimen of metronidazole or clindamcyin is preferred, there is also a fairly effective single-dose therapy. Treatment of bacterial vaginosis is of critical importance because of the potential for upper genital tract infections and other serious complications.

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