

Chapter 7

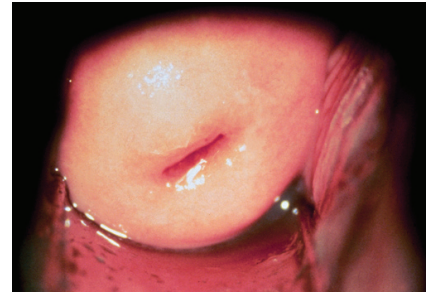
CERVICITIS

Women with vaginal discharge, with or without evidence of vaginitis, should be carefully evaluated for cervicitis. Cervical infection can be regarded as the usual portal of entry for *Neisseria gonorrhoeae* and *Chlamydia trachomatis* in women; and as such, cervicitis can be thought of as the female counterpart to male urethritis. Infections of the cervix represent an important reservoir for the sexual or perinatal transmission of pathogenic microorganisms and the usual source from which upper genital tract infections develop.

In order to recognize the signs of cervical inflammation, it is important to understand the histologic changes which normally occur in the cervix during the reproductive period and menstrual cycle. The normal cervix consists of

- squamous,
- columnar, and
- metaplastic squamous epithelia.

Squamous epithelium covers most of the cervix and is flat, pink, and opaque, rather like the lining of the mouth. Columnar epithelium may be confined to the endocervical canal or may occur surrounding the cervical os, where it is often called “ectopy.” Ectopy is commonly seen in young women (typically seen in women <25 years old) and in women using oral contraceptives. Columnar epithelium is redder and more like the lining of the eyelid in appearance. These two types of epithelia meet at the squamocolumnar junction of the cervix. These images show examples of these different types of normal cervical epithelia.



Normal cervix without ectopy [18]

Metaplastic epithelium occurs at the squamocolumnar junction, a transformation zone where columnar epithelium is being replaced by new squamous epithelium. As women grow older, this transformation of the epithelium at the squamocolumnar junction retreats into the endocervical canal. Since this junctional area should be sampled for a Pap smear, in older women it is important to get an endocervical specimen. Nabothian cysts also occur in the transformation zone, which are benign, pearly white or yellow, nonfriable cysts containing clear cervical mucus.



Normal cervix with ectopy [19]

Another useful indicator of cervical function is cervical mucus. In general, cervical mucus is clear during ovulation and cloudy white during postovulation. It is important to know whether a woman is using oral contraceptives, because this may also affect the appearance of cervical mucus. Yellow (purulent) mucus indicates the presence of large numbers of polymorphonuclear leukocytes (PMNs).

TABLE 7-1**PROPERTIES OF NORMAL CERVICAL MUCOUS DURING THE MENSTRUAL CYCLE**

TIME OF CYCLE	AMOUNT¹	VISCOSITY²	COLOR³	SPINBARKEIT⁴	FERNING⁵	pH
Post-menstuation	moderate	thick	cloudy or white	<1"	no	6.8
Nearing ovulation	increasing	somewhat thick to thin	mixed cloudy and clear	1-1½"	moderate	6.8
Ovulation	maximum	very thin and slippery	clear	6-8"	well-developed	7.6-8.0
Post-ovulation (about 3 days)	decreasing	thin	mixed cloudy and clear	4-6"	minimal or none	6.8
Nearing menstruation	minimal	thick	cloudy	<1-1½"	none	6.8

¹ Amount (volume) means the woman's subjective interpretation of what she feels with her finger at the introitus and/or inside her vagina.

² Viscosity means the consistency of mucus.

³ Color can vary quite a bit, and clear mucus may be tinged with blood at the time of ovulation.

⁴ Spinnbarkeit means elasticity: how much can you stretch a mucous sample before it breaks?

⁵ Ferning means that a sample of mucous taken on a fertile day, smeared on a glass slide, and air-dried will reveal a microscopic pattern that looks like fern leaves.

Adapted from *Health Education Bulletin*, July 1979, by the National Clearinghouse for Family Planning Information, DHEW, Bureau of Community Health Services.

Table 7-1 summarizes the properties of normal cervical mucus at different stages of the menstrual cycle.

ETIOLOGY

Cervicitis is most often caused by sexually transmitted pathogens, but may also be caused by systemic diseases (such as autoimmune diseases, Stevens-Johnson Syndrome, or viral infections), neoplasia, or mechanical/chemical trauma. The two main sexually transmitted agents responsible for clinically apparent mucopurulent endocervicitis are *C. trachomatis* (CT) and *N. gonorrhoeae* (GC). Herpes simplex virus (HSV) causes an ectocervicitis, as may *Trichomonas vaginalis*.

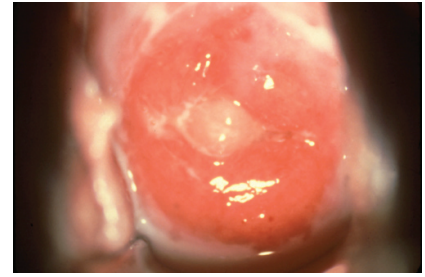
CLINICAL MANIFESTATIONS

Factors which suggest the presence of cervicitis are:

1. Endocervical mucus which may be
 - mucopurulent (yellow or green),
 - increased in amount, or
 - have an increased number of PMNs (>30 PMNs/1000X field) on endocervical Gram stain.
2. Ectocervix which may show
 - ectopy,
 - edema in the area of ectopy, or
 - easily induced mucosal bleeding.



Mucopurulent discharge from cervix on a swab (positive swab test) [20]

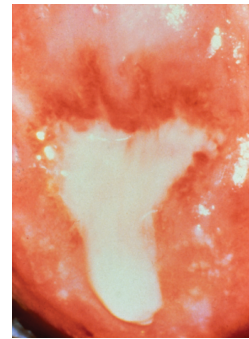


Mucopurulent cervicitis due to chlamydia showing ectopy, edema, and discharge [43]

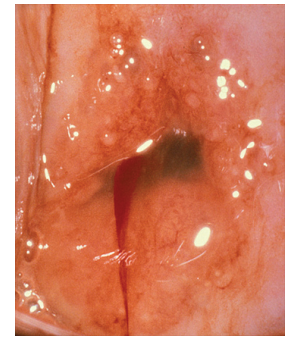
DIAGNOSIS

Herpes Simplex Virus

Ectocervicitis due to herpes is usually seen in primary genital herpes infection and produces ulcerative, necrotic lesions which are painless and visible on the ectocervix. External genital herpetic lesions are also usually seen upon examination. The physical examination thus can often provide presumptive evidence of herpetic cervicitis. If cultures are available, HSV can be isolated from the cervical cultures of more than 80% of women with primary herpes infection.



Mucopurulent cervicitis [44]



Chlamydial cervicitis with ectopy, discharge, bleeding [23]

Neisseria gonorrhoeae

In women without evidence of erosive ectocervical inflammation, the major etiologic agents of endocervicitis to be considered are *C. trachomatis* (CT) and *N. gonorrhoeae* (GC).

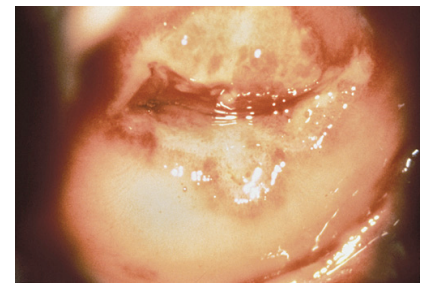
Gonococcal infections in cases of cervicitis can be diagnosed by

- Gram stain in approximately 50 to 60% and
- cultures in 80 to 90% of women.

Chlamydia trachomatis

CT should be strongly suspected in women with probable cervicitis based upon

- the presence of mucopurulent discharge from the cervical os,
- easily induced mucosal bleeding, and
- edema in the area of ectopy.



Erosive ecto and endo cervicitis due to HSV infection [24]



Normal cervix with ectopy [19]

Studies have shown that the presence of >30 PMNs/1000X field in an endocervical Gram stain in nonmenstruating women or a swab inserted into the cervix showing a yellow color independently correlate with the presence of CT infection. However, the predictive value of ≥ 30 PMNs/1000x field for cervical GC or chlamydial infection is lower with increasing age of the woman. The most sensitive chlamydia test should be obtained, preferably a nucleic acid amplification test (NAAT). Patients with suspected cervicitis should be empirically treated for presumed chlamydial infection (see Figure 7-1). It should be emphasized that the majority of women with chlamydial cervical infection lack typical signs of cervicitis and thus can only be identified through specific laboratory testing.

Other agents

Other agents may also cause cervical infection. Human papillomavirus (HPV) infection may cause visible papillary warts, leukoplakia, or subclinical papillomavirus infection (SPI) (“flat” condyloma, which can only be seen using a colposcope). HPV can also be detected as koilocytosis (cells with enlarged nuclei and large perinuclear halos of cytoplasmic clearing) on a Pap smear. There is no culture available yet for HPV, but tests are available to detect HPV DNA. *Trichomonas vaginalis* may cause a purulent discharge and a blotchy “strawberry” ectocervix.

TREATMENT

For a more detailed discussion of these regimens and other treatment considerations, please refer to the CDC STD Treatment Guidelines at <http://www.cdc.gov/std/treatment/>.

Chlamydia trachomatis

Recommended regimen

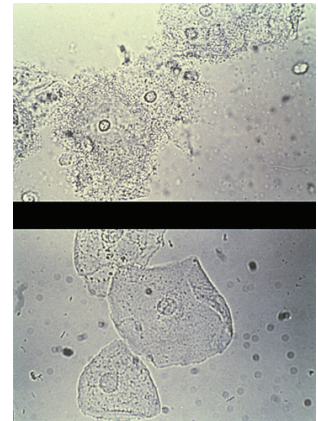
Any of the following:

- Doxycycline 100 mg bid for 7 days
- Azithromycin 1.0 g single dose
- Patients in whom doxycycline is contraindicated or not tolerated:
 - Ofloxacin 300 mg orally bid for 7 days
 - Levofloxacin 500 mg orally for 7 days

Alternative regimen

Either of the following:

- Erythromycin base 500 mg orally 4 times daily for 7 days
- Erythromycin base 250 mg orally 4 times daily for 14 days
- Erythromycin ethylsuccinate 800 mg orally 4 times daily for 7 days
- Erythromycin ethylsuccinate 400 mg orally 4 times daily for 14 days



Normal and “clue” cells seen in vaginal saline prep [17]



“Strawberry” cervix due to *T. vaginalis* [25.]

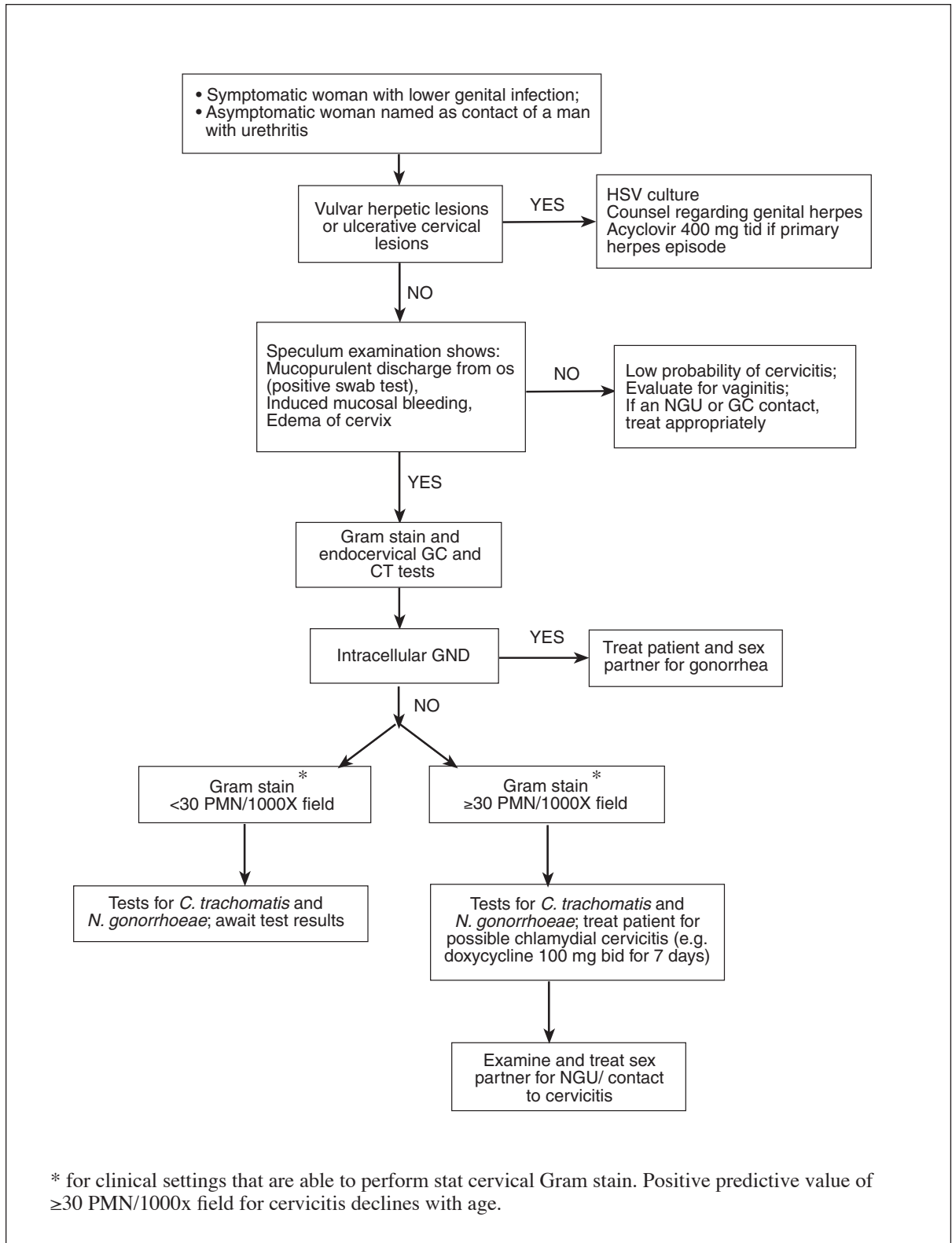


Figure 7-1
Evaluation and management of possible mucopurulent cervicitis

Neisseria gonorrhoeae

Any of the following:

- Cefixime 400 mg PO (single dose) (if available)
- Cefpodoxime 400 mg PO (single dose)
- Ceftriaxone 125 mg IM (single dose)

Note: 1) Doxycycline is also provided with any of the above treatments for empirical treatment of possible coexisting *C. trachomatis* infection. Alternatively, azithromycin 1 gm PO single dose can be used instead of doxycycline for treatment of possible co-existing chlamydial infection.

Herpes Simplex Virus

See Chapter 9 for more information on genital ulcers.

Trichomonas vaginalis

See Chapter 6 for more information on vaginitis.

FOLLOW-UP

Herpes Simplex Virus

Patients should be informed about

- the natural history of HSV infection, including asymptomatic viral shedding, and
- the need to abstain from sexual contact while lesions are present even if using acyclovir.

Women with HSV infection, even if asymptomatic, should

- have their male partners use condoms, unless the partner also has genital herpes,
- have yearly Pap smears, and
- inform their clinician early in pregnancy of a history of genital herpes infection (in themselves or their sex partners).

Chlamydia trachomatis

When taken as directed, the doxycycline and azithromycin regimens listed are highly effective in treating CT. Therefore, post-treatment test-of-cure cultures or nonculture tests should not be performed. In treatment failures, test-of-cure may not become positive until 3 to 6 weeks after treatment. When they are positive, patients should be retreated with one of the regimens listed previously and any interim sex partners should be examined and treated.

Neisseria gonorrhoeae

If first line therapy (cefixime, ceftriaxone, or cefpodoxime) is used to treat gonorrhea, a test-of-cure is not recommended. If symptoms persist, follow-up cultures should be obtained from the infected site(s) 3 to 7 days after completion of treatment. If alternative therapies are used (for example a fluoroquinolone) a test-of-cure should be obtained 5-7 days after treatment if using culture or 3 weeks after treatment if using nucleic acid amplified test (NAAT). Confirmed cases of gonorrhea should be reported to the state/local health department (To locate health department STD programs, visit <http://www.ncsddc.org/programsites.htm>).

Human Papillomavirus

Women with visible cervical warts should get a Pap smear and be referred to a gynecologist for colposcopy and biopsy.

MANAGEMENT OF SEXUAL CONTACTS

Herpes Simplex Virus

Routine treatment of sex partners is not indicated.

Chlamydia trachomatis

All persons exposed to *C. trachomatis* infection should be examined for STD and promptly treated with doxycycline 100 mg orally twice daily for 7 days or azithromycin 1.0 gram orally (single dose).

Neisseria gonorrhoeae

Sexual partners exposed to gonorrhea within the past 30 days should be examined, cultured, and treated prophylactically with one of the regimens which covers both gonococcal and chlamydial infections, for example,

- Cefixime 400 mg PO (single dose) plus doxycycline 100 mg PO bid x 7 days.

Human Papillomavirus

Sex partners should be examined for visible HPV and treated if warts are found.

Trichomonas vaginalis

See Vaginitis, Chapter 6.

COMPLICATIONS/SEQUELAE

The major complications of cervical infection include

1. ascending infection, which may cause endometritis or PID (resulting in infertility or ectopic pregnancy);
2. neonatal infection with *C. trachomatis*, *N. gonorrhoeae*, or herpes simplex virus;
3. reinfection of the original sexual partner or infection of a new partner;
4. cervical neoplasia; or
5. disseminated gonococcal infection (although, of note, DGI is most commonly observed to be caused by strains that evade complement-killing and as a result, do not cause lower genital tract symptoms before dissemination).



Lesion of disseminated gonococcal infection [5]