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# Sexually Transmitted Infections During Pregnancy

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Sexually transmitted infections (STIs) in pregnancy may result in adverse pregnancy outcomes, fetal infection, neonatal infection, and a broad range of social consequences. Adverse pregnancy outcomes include ectopic pregnancy, miscarriage, and stillbirth, congenital and perinatal infections, and maternal puerperal infections. Infection before pregnancy can lead to ectopic pregnancy and infertility, and infection during pregnancy can cause miscarriage, chorioamnionitis, preterm delivery, small-for-dates infants, and congenital infection. The susceptibility to infection is increased during pregnancy, and the clinical manifestations of some STIs are altered during pregnancy. STIs present at delivery can cause maternal puerperal infection and neonatal infections.

## ■ PREGNANCY-RELATED COMPLICATIONS OF STIS

Although fertility-related complications are not the specific focus of this chapter, they are among the most critical and costly complications of unprotected sexual intercourse and STI. Ectopic pregnancy and infertility are recognized complications of salpingitis; the most common causes of salpingitis are *Neisseria gonorrhoeae* and *Chlamydia trachomatis*. The risk of ectopic pregnancy increases 10-fold following an episode of salpingitis. Both chlamydial and gonococcal infection can cause salpingitis, resulting in tubal obstruction, a major cause of infertility.

Postabortal infections following surgical terminations are substantially increased in women with co-existent chlamydia, gonorrhea, or bacterial vaginosis. Screening and treating women for these infections pre-

surgery has led to a reduction in febrile morbidity rates (Qvistad et al. 1983; Crowley et al. 2001). If screening is not practical, many clinics and practitioners routinely treat all women receiving surgical abortion for chlamydia presumptively and, in high prevalence areas, would treat for gonorrhea as well.

Intrauterine infection may be the result of hematogenous or ascending infection. For example, congenital syphilis *Treponema pallidum* is hematogenously spread in the mother's blood and invades the placenta and fetal tissues. Such infection produces characteristic histologic changes in the placenta. Ascending infection from the cervix and vagina may occur through intact or compromised fetal membranes and can cause chorioamnionitis and amniotic fluid infection. HIV and hepatitis B, in contrast, are hematogenously disseminated in the mother but do not pass the placental barrier. Vertical transmission occurs in these cases at parturition, through exposure to blood and secretions.

Fetal loss, prematurity, and preterm rupture of membranes, low birth weight, and a variety of perinatal complications occur more frequently in pregnant women with reproductive tract infections, including STIs and bacterial vaginosis.

Intrauterine or perinatally transmitted STIs can have severely debilitating effects on pregnant women, their partners, and their fetuses, and are among the top causes of disability-adjusted life years lost in developing countries. All pregnant women and their sex partners should be asked about STIs, counseled about the possibility of perinatal infections, and ensured access to treatment, if needed.

### ■ SCREENING FOR STIs IN PREGNANCY

The antenatal care visit provides an opportunity for screening pregnant women for STIs and for providing critically important surveillance data to STI and perinatal program managers. The infections that are screened will depend on the prevalence of infections in the community in which the pregnant woman lives and on the individual woman's risk for acquiring infection. Screening tests are available for most STIs; however, the range of tests available in resource-constrained settings may be limited. Generally, comprehensive testing is recommended at an early prenatal visit (in the first trimester). Depending on the organism, the clinical setting, and risk profile, testing may be repeated during the third trimester as parturition approaches. Clinicians should not be deluded that once engaged in prenatal care, that patient's risk disappears!

### ■ HIV TESTING

All pregnant women should be offered voluntary HIV testing at the first antenatal visit. Repeat testing for HIV is advisable in the third trimester and at the time of delivery in women at greater risk for infection, including women that have an STI during pregnancy or have multiple sexual partners during pregnancy, those that have an HIV-infected partner, those using illicit drugs, and those that live in or come from areas where HIV prevalence is high.

HIV testing consent requirements are in transition, from the former "HIV testing exceptionalism" that requires a separate consent process, to "normalization," wherein HIV testing is routinely provided unless practitioners are specifically asked not to test. Testing should occur after the patient is notified that she will be tested for HIV as part of the routine panel of prenatal tests (Centers for Disease Control and Prevention 2010; American College of Obstetricians and Gynecologists 2003). For women who decline, providers should continue to strongly encourage testing and address concerns that pose obstacles to testing. Women who decline testing because they have had a previous negative HIV test should be informed of the importance of retesting during each pregnancy. The concept of incident infection should be reemphasized. Testing pregnant women is particularly important, because antiretroviral and obstetric interventions can reduce the risk of perinatal HIV transmission to below 2%. In settings where women present for delivery and their HIV status is undocumented, rapid testing should be performed if available.

Pregnant women identified as HIV infected should be staged with CD4 and viral load testing, as well as for opportunistic infections. As soon as possible, they should be apprised of the potential options available to them. Three options are (1) term delivery with appropriate antiretroviral prenatal and perinatal intervention, which reduces vertical transmission to <2%; (2) term delivery without antiretroviral therapy, which carries a 30% risk of vertical transmission; and (3) pregnancy termination. Women should also be apprised that current data suggest that pregnancy during HIV infection does not result in increased adverse HIV-related events or complications. Women who carry a pregnancy to term should be advised that 1–15% of seronegative infants will become infected during breast-feeding if HIV-infected women breast-feed their infants into the second year of life.

Pregnant women who are HIV infected should be counseled concerning their options (either on-site or by referral), given appropriate antenatal treatment, and advised not to breast-feed their infants if infant formula is readily available and can be safely prepared.

### ■ SCREENING FOR SYPHILIS

A serologic test for syphilis should be performed on all pregnant women at the first prenatal visit. Where prenatal care is not optimal, rapid plasma reagin (RPR)-card test screening should be performed, and if the test is reactive, treatment should be given at the prenatal visit. Women who are at high risk for syphilis, live in areas of excess syphilis morbidity, were previously untested, or have positive serology in the first trimester should be screened again early in the third trimester (28 weeks gestation) and at delivery. Ideally, women should be retested at delivery, and infants should not be discharged from the hospital unless the syphilis serologic status of the mother has been determined at least one time during pregnancy and preferably again at delivery. Any woman who delivers a stillborn infant should be tested for syphilis. Congenital syphilis is considered in most areas to be a "sentinel public health event" because it is 100% preventable through screening and treatment.

### ■ TESTING FOR HEPATITIS B VIRUS INFECTION

A serologic test for hepatitis B surface antigen (HBsAg) should be performed on all pregnant women at the first prenatal visit. HBsAg testing should be repeated late in pregnancy for women who are HBsAg negative but who

are at high risk for HBV infection, including injection-drug users and women who have other STIs.

Women who are HBsAg positive should be referred for assessment and medical management and for assessment and vaccination of their sexual partners and household contacts. The hospital in which delivery is planned and the provider who will care for the newborn should be notified of the woman's HBsAg result so that the neonate may be provided with immunoprophylaxis. At time of delivery, the combined provision of hepatitis B hyperimmune globulin (passive vaccination), and initiation of the hepatitis B vaccine series is highly effective in preventing vertical transmission of hepatitis B.

In contrast to the situation with HIV, pregnant women who are HBsAg positive should be reassured that breast-feeding is not contraindicated and should receive information regarding hepatitis B modes of transmission, prevention of transmission, and the importance of postexposure prophylaxis for the neonate and hepatitis B vaccination for household contacts and sex partners.

### ■ SCREENING FOR CHLAMYDIAL INFECTION

Chlamydia is highly prevalent and is associated with a host of perinatal complications, including low birth weight, ophthalmia neonatorum, and neonatal pneumonia. Screening interventions have markedly reduced the incidence of these complications. Chlamydial testing should be performed at the first prenatal visit. In resource-limited areas, at-risk women should be prioritized for testing. These include women younger than 25 years old and women who have a new or more than one sex partner. These persons should also be tested again during the third trimester to prevent maternal postnatal complications and chlamydial infection in the infant. Screening during the first trimester might enable prevention of adverse effects of chlamydial infection during pregnancy, such as low birth weight (McMillan et al. 2006). Nucleic acid amplification tests (NAATs) are most convenient, as these may be performed on self-obtained lower vaginal swabs. NAATs may be carried out to detect both chlamydial and gonococcal infection on the same specimen.

### ■ SCREENING FOR GONORRHEA

Gonorrhea during pregnancy is also associated with low birth weight but, more important, severe ophthalmia neonatorum and keratitis in infants born to infected mothers. Screening should be performed at the first prenatal visit. In resource-poor settings, screening should be reserved for

women at risk or for women living in an area in which the prevalence of *N. gonorrhoeae* is high (Miller et al. 2003). A repeat test should be performed during the third trimester for those at continued risk. Testing can be performed by either culture (of endocervical secretions) or NAATs. As with chlamydia, NAATs are highly sensitive, specific, and offer the widest range of testing specimen types and may be used with self-obtained vaginal swabs, endocervical swabs, vaginal swabs, and urine. Current test formats allow a single specimen to be collected for testing for both chlamydia and gonococcal infections (Schachter et al. 2005; Bignall 2004).

### ■ TESTING FOR HEPATITIS C VIRUS INFECTION

A test for hepatitis C antibodies (anti-HCV) should be performed at the first prenatal visit for pregnant women at high risk for exposure, including those with a history of injection-drug use, repeated exposure to blood products, prior blood transfusion, or organ transplants.

No treatment is available for anti-HCV-positive pregnant women. However, all women found to be anti-HCV-positive should receive appropriate counseling and referral for assessment and management. Currently, no vaccine is available to prevent HCV transmission. Vertical transmission occurs, but with much reduced efficiency compared with the other bloodborne infections.

### ■ EVALUATION FOR BACTERIAL VAGINOSIS

Bacterial vaginosis is a clinical diagnosis that is related to alterations of the vaginal flora (see Chapter 7). BV is extremely common in some populations and is associated in particular with premature rupture of membranes (PROM), chorioamnionitis, and postpartum endometritis. Despite these clear associations, the clinical trial data conflict on whether treatment of all BV during pregnancy reduces complications. There is consensus, however, that treatment of symptomatic BV is warranted. Evaluation for bacterial vaginosis (BV) may be conducted at the first prenatal visit for asymptomatic patients who are at high risk for preterm labor (e.g., those who have a history of a previous preterm delivery), which would then warrant observation.

### ■ PAPANICOLAOU SMEAR

A Papanicolaou (Pap) smear can be obtained at the first prenatal visit if the patient is due for a Pap smear according to national guidelines (see Table 40-1).

**TABLE 40-1** Summary of Recommendations for Screening for STIs During Pregnancy**HIV infection**

All women should be screened for HIV infection at the first prenatal visit. If negative, repeat testing should be performed in the third trimester and again at delivery in women at high risk for infection.\*

**Syphilis**

All women should have syphilis serology performed at the first prenatal visit. Women at high risk # for syphilis should be retested in the third trimester and again at delivery.

**Chlamydial infection**

All women should have a chlamydia screening test offered at the first prenatal visit, and those women considered to be at high risk for infection should have repeat testing in the third trimester and again at delivery. ¶

**Gonorrhea**

All women should have a gonorrhea screening test offered at the first prenatal visit, and those women considered to be at high risk for infection should have repeat testing in the third trimester and again at delivery. ¶

**Hepatitis B**

All pregnant women should be screened for the hepatitis B surface antigen at the first prenatal visit. The test should be repeated in the third trimester if it was negative initially in women at high risk for infection. §

**Hepatitis C**

Screening for hepatitis C should be carried out in women at risk for infection, including those with a history of injection-drug use, repeated exposure to blood products, prior blood transfusion, or organ transplants.

**Bacterial vaginosis**

Women with a history of previous preterm labor should have an assessment for bacterial vaginosis at the first prenatal visit.

**Pap smear**

A Pap smear can be carried out at the first prenatal visit in women who have are due to have the test according to national guidelines and recommendations.

\* Women at high risk for HIV infection include women that have an STI during pregnancy or have multiple sexual partners during pregnancy, those that have an HIV-infected partner, those engaged in using illicit drugs, and in those that live in or come from areas where HIV prevalence is high.

# Women at high risk for syphilis include those living in areas with excess syphilis morbidity, are previously untested, and those that have positive serology in the first trimester.

¶ Women at greater risk for chlamydial or gonococcal infection include those aged younger than 25 years, and those who have a new or more than one sex partner.

§ Women at greater risk for hepatitis B infection include women who are injecting-drug users and those that have an STI during pregnancy.

There is insufficient evidence of benefits of routine screening for trichomoniasis, human papilloma virus, and herpes simplex virus in asymptomatic pregnant women.

## ■ MANAGEMENT OF SEXUALLY TRANSMITTED INFECTIONS IN PREGNANCY

The following section briefly describes the management of STIs during pregnancy (CDC 2010). For all STIs, contact tracing and treatment and partner notification should be carried out together with appropriate screening, and all persons with STIs and their partners should be offered education and counseling for risk reduction.

## ■ SYPHILIS

Syphilis in pregnancy is treated the same way as in non-pregnant persons. Infection is managed according to the stage of infection. Parenteral penicillin is the treatment of choice and is most conveniently given in the long-acting form intramuscularly. For pregnant women with primary, secondary or early latent syphilis, a single intramuscular dose of 2.4 million units of benzathine

penicillin is given. Please note that early latent syphilis is defined differently in the United States (<1 year) and in the United Kingdom (< 2 years duration). In pregnant women with late latent syphilis (1 year in the United States) duration or of unknown duration, 2.4 million units of benzathine penicillin is given each week for 3 weeks (total dose 7.2 million units).

Pregnant women with neurosyphilis, that is, those with neurologic signs such as cognitive dysfunction, motor or sensory deficits, ophthalmic or auditory symptoms, cranial nerve palsies, and symptoms or signs of meningitis; those with syphilitic eye disease such as uveitis, neuroretinitis, and optic neuritis; and those with abnormal cerebrospinal fluid should be given aqueous crystalline penicillin 18 to 24 million units daily administered as 3 to 4 million units intravenously every 4 hours or by continuous infusion, for 10 to 14 days, followed by 3 doses of 2.4 million units of benzathine penicillin given intramuscularly each week for 3 weeks.

Penicillin is the only antibiotic recommended in treating syphilis in pregnancy, and pregnant women who are allergic to penicillin should be admitted for desensitization and then given full treatment. Though erythromycin and, more recently, azithromycin has been suggested for treating syphilis in pregnancy, treatment failures to prevent congenital syphilis are well documented, and therefore macrolides are not recommended. Tetracyclines, which are often used to treat syphilis in penicillin-allergic patients, are absolutely contraindicated in pregnancy.

Following completion of full treatment, patients should be monitored regularly and RPR or VDRL titers should be measured at 3, 6, and 12 months.

### ■ CHLAMYDIAL INFECTION

For the treatment of chlamydial infection in pregnancy, the following treatment regimens are recommended:

Azithromycin 1 g in a single oral dose. This is the preferable regimen since compliance can be assured.

Alternative regimens include

Amoxicillin 500 mg orally 8 hourly for 7 days

Alternatively, the following may be used:

Erythromycin base 500 mg orally 6 hourly for 7 days, or

Erythromycin base 250 mg orally 6 hourly for 14 days, or

Erythromycin ethyl succinate 800 mg orally 6 hourly for 7 days, or

Erythromycin ethyl succinate 400 mg orally 6 hourly for 14 days

The lower-dose 14-day regimens may be used if gastrointestinal tolerance is a problem

Erythromycin estolate is contraindicated in pregnancy because of drug-related hepatotoxicity

Considering the sequelae that might occur in the mother and neonate if chlamydial infection persists, it is recommended that tests for cure are performed using NAATs 3 weeks after completion of therapy to ensure therapeutic cure.

### ■ GONOCOCCAL INFECTION

The options for treatment of gonococcal infection in pregnancy are limited. Quinolone class drugs are contraindicated in pregnancy. Therefore, only the following treatment regimens are recommended:

Ceftriaxone 250 mg in a single intramuscular dose, or

Cefixime 400 mg in a single oral dose

Pregnant women who are allergic to penicillins or beta-lactam drugs need to be referred to a referral center for consideration of alternative regimens.

As coinfection with *C. trachomatis* commonly occurs in persons with gonorrhea, it is advisable to also treat all pregnant women with gonorrhea for presumptive chlamydial infection with azithromycin or amoxicillin.

### ■ GENITAL HERPES

The management of genital herpes in pregnancy is complex, and the major concern is preventing rare, but devastating neonatal herpes syndrome, which occurs through vertical transmission and exposure to maternal secretions. The following “ground rules” are useful:

1. In settings where genital HSV is common, most persons are infected before pregnancy. Women who are HSV-2 positive (seroprevalent) do not pose an increased risk to the infant, unless there are active lesions apparent at time of delivery.
2. The highest risk of vertical transmission is when a pregnant woman acquires *primary* (incident) HSV disease during the last trimester of pregnancy.

Routine screening for herpes simplex virus infection in asymptomatic pregnant women is not indicated. Cultures for herpes simplex virus may be performed in the presence of clinically suspicious genital lesions during pregnancy in



women to confirm the diagnosis of genital herpes. Culture is not necessary in women who have been previously diagnosed with HSV.

Genital herpes is a chronic, lifelong viral infection. Two types of HSV have been identified, HSV-1 and HSV-2. The diagnosis of genital herpes infection may be made by virologic and type-specific serologic tests. Isolation of HSV in cell culture is the preferred virologic test for patients who seek medical treatment for genital ulcers or other mucocutaneous lesions. However, the sensitivity of culture is low, especially for recurrent lesions, and declines rapidly as lesions begin to heal. PCR assays for HSV DNA are more sensitive and have been used instead of viral culture but are not yet widely available. Type-specific antibodies to HSV develop 4–6 weeks after infection and persist indefinitely. Type-specific serology tests are now available commercially and may be performed to determine whether a pregnant woman whose partner has a history of genital herpes is susceptible to primary infection. However, these tests are costly, and routine screening is not recommended.

Because acquisition of primary herpes during late pregnancy carries the greatest risk, women without known genital herpes should be counseled to avoid intercourse during the third trimester with partners known or suspected of having genital herpes. Type-specific serologic tests may be useful to identify pregnant women at risk for HSV infection and to guide counseling regarding the risk for acquiring genital herpes during pregnancy.

All pregnant women should be asked whether they have a history of genital herpes. At the onset of labor, all women should be examined carefully for herpetic lesions. Women without symptoms or signs of genital herpes or its prodrome can deliver vaginally. In women with recurrent genital herpetic lesions at the onset of labor, delivery by cesarean section may be considered to prevent neonatal herpes, which can reduce, but not eliminate HSV transmission to the infant. Infants exposed in these settings can be treated presumptively with acyclovir for the first 2 weeks of life.

### Management of Women with the First Episode of Genital Herpes in Pregnancy

All women with a first episode of genital herpes in pregnancy should be given aciclovir orally as follows (Royal College of Obstetricians and Gynaecologist 2002):

- Acyclovir 400 mg orally 8 hourly for 5 days.
- Delivery by cesarean section is *recommended* if the first episode of genital herpes lesions occurs at the

time of delivery and delivery by cesarean section may be *considered* if the first episode occurs within 6 weeks of the expected date of delivery or onset of preterm labor.

### ■ MANAGEMENT OF WOMEN WITH A RECURRENT EPISODE OF GENITAL HERPES IN PREGNANCY

Women with a recurrent episode of genital herpes in pregnancy may be managed as follows:

- Daily suppressive acyclovir in the last 4 weeks of pregnancy may be *considered*; in this situation, aciclovir is given in a dose of 400 mg orally 12 hourly.
- Delivery by caesarean section may be *considered* for women presenting with recurrent genital herpes at the onset of labor. However, it is generally considered that this intervention is controversial and not cost effective.

In managing pregnant women with genital herpes, it is good clinical practice that the patient is managed jointly by a genitourinary or infectious diseases specialist and obstetrician.

### ■ BACTERIAL VAGINOSIS

Bacterial vaginosis (BV) is a polymicrobial clinical syndrome resulting from replacement of the normal hydrogen peroxide-producing lactobacilli species in the vagina with high concentrations of *Gardnerella vaginalis*, *Mycoplasma hominis*, and anaerobic bacteria such as *Prevotella* sp. and *Mobiluncus* sp. The cause of the microbial alteration is not fully understood. However, BV is associated with having multiple sex partners, a new sex partner, douching, and lack of vaginal lactobacilli.

BV during pregnancy is associated with adverse pregnancy outcomes, including premature rupture of the membranes, preterm labor, preterm birth, intra-amniotic infection, and postpartum endometritis. Managing asymptomatic BV in pregnancy is controversial. Symptomatic women with BV and all women with BV with a history of preterm delivery should be treated as follows:

Metronidazole 400 to 500 mg twice daily for 7 days, or a single 2 g dose.

Alternatively, clindamycin is given in a dose of 300 mg orally twice daily for 7 days, OR

Intravaginal clindamycin cream (2%) is applied once daily for 7 days.

In women with a history of previous preterm delivery and BV, tests of cure should be carried out 4 weeks after completion of treatment.

Whether treatment of asymptomatic pregnant women with BV who are at low risk for preterm delivery reduces adverse outcomes of pregnancy is unclear.

## ■ TRICHOMONIASIS

Women with trichomoniasis may be completely asymptomatic or may have symptoms of vaginal discharge characterized by a diffuse, malodorous, yellow green vaginal discharge with vulval irritation. Trichomoniasis is usually visually diagnosed when motile trichomonads in wet mounts of vaginal fluid are examined microscopically. The organism may be cultured in special media, such as the *InPouch*. Vaginal trichomoniasis has been associated with adverse pregnancy outcomes, particularly premature rupture of membranes, preterm delivery, and low birth weight. However, metronidazole treatment has not found that there is a decrease in perinatal morbidity. Women should be treated as follows:

Women may be treated with 2 g of metronidazole in a single oral dose.

Alternatively, metronidazole may be given in a dose of 400 to 500 mg orally twice daily for 7 days.

## ■ VULVOVAGINAL CANDIDIASIS

Vulvovaginal candidiasis (VVC) occurs commonly during pregnancy is caused by *Candida albicans* but occasionally is caused by other *Candida* species or yeasts. Typical symptoms of VVC include pruritus, vaginal soreness, dyspareunia, dysuria, and abnormal vaginal discharge. None of these symptoms were specific for VVC. VVC is extremely common, and it is estimated that 75% of women will have at least one episode of VVC and up to 45% will have two or more episodes. VVC frequently occurs during pregnancy (Young and Jewell 2000).

Only topical azole therapies, applied for 7 days, are recommended for use in pregnant women.

Miconazole 100 mg vaginal suppository, one suppository for 7 days or

Terconazole 0.4% cream 5 g intravaginally for 7 days

## ■ CHANCROID

In pregnant women with chancroid, the following treatment regimens may be used:

Azithromycin 1 g orally in a single dose, OR

Ceftriaxone 250 mg intramuscularly in a single dose, OR

Erythromycin base 500 mg orally three times a day for 7 days

Patients should be reexamined 3 to 7 days after initiation of therapy. If treatment is successful, ulcers usually improve symptomatically within 3 days and objectively within 7 days after therapy. The time required for complete healing depends on the size of the ulcer; large ulcers might require more than 2 weeks for complete healing. If no clinical improvement is evident, the clinician must consider whether the diagnosis is correct, the patient is coinfecting with another STI or HIV, treatment was not used as instructed, or the strain of *Haemophilus ducreyi* causing the infection is resistant to the prescribed antimicrobial.

Clinical resolution of fluctuant lymphadenopathy is slower than resolution for ulcers and might require needle aspiration.

## ■ DONOVANOSIS

Pregnant women with Donovanosis (granuloma inguinale) may be treated as follows:

Azithromycin 1 g orally once per week for at least 3 weeks and until all lesions have completely healed

Alternatively patients may be treated with

Erythromycin base 500 mg orally four times a day for at least 3 weeks and until all lesions have completely healed

Treatment halts progression of lesions, although prolonged therapy is usually required to permit granulation and reepithelialization of the ulcers. Relapse can occur 6 to 18 months after apparently effective therapy. Patients should be followed clinically until signs and symptoms have resolved.

## ■ LYMPHOGRANULOMA VENEREUM

Lymphogranuloma venereum (LGV) is caused by *C. trachomatis* serovars L1, L2, or L3. The most common clinical manifestation of LGV among heterosexuals is tender inguinal or femoral lymphadenopathy that is typically unilateral. A self-limited genital ulcer or papule sometimes occurs at the site of inoculation. However, by the time patients seek care, the lesions might have disappeared. Rectal exposure might result in proctocolitis (including mucoid or hemorrhagic rectal discharge, anal pain, constipation,

fever, or tenesmus). Genital ulcer swab (or bubo aspirate) may be tested for *C. trachomatis* by culture, direct immunofluorescence, or nucleic acid detection. Genotyping is required for differentiating LGV from non-LGV *C. trachomatis* but are not widely available.

Pregnant women with LGV should be treated with:  
Erythromycin base 500 mg orally four times a day for 21 days

There is expert opinion that azithromycin 1.0 g orally once weekly for 3 weeks is probably effective. Buboec might require aspiration through intact skin or incision and drainage to prevent the formation of inguinal/femoral ulcerations.

## ■ GENITAL WARTS

More than 30 types of human papilloma virus (HPV) can infect the genital area (see Chapters 6 and 22). The majority of HPV infections are asymptomatic, unrecognized, or subclinical. Genital HPV infection is common and usually self-limited. Genital HPV infection occurs more frequently than visible genital warts among both men and women and cervical cell changes among women. Genital HPV infection can cause genital warts, usually associated with HPV types 6 or 11. Other HPV types that infect the anogenital region (e.g., high-risk HPV types 16, 18, 31, 33, and 35) are strongly associated with cervical neoplasia. Persistent infection with high-risk types of HPV is the most important risk factor for cervical neoplasia.

In the absence of genital warts or cervical squamous epithelial lesions (SIL), treatment is not recommended for subclinical genital HPV infection, whether it is diagnosed by colposcopy, biopsy, acetic acid application, or through the detection of HPV by laboratory tests. Genital HPV infection frequently goes away on its own, and no therapy has been identified that can eradicate infection. In the presence of coexistent SIL, management should be based on histopathologic findings.

The diagnosis of genital warts is made on finding flat, papular, or pedunculated growths on the genital mucosa. The use of HPV testing for genital wart diagnosis is not recommended. The diagnosis is made by visual inspection and may be confirmed by biopsy, which is only needed if the diagnosis is uncertain.

## Treatment

The primary goal of treating visible genital warts is removing the warts. Treatment of genital warts does not

eliminate HPV infection. Conventional treatments for genital warts, such as imiquimod, podophyllin, and podofilox, should not be used during pregnancy. However, cryotherapy and 80% trichloroacetic acid can be used safely. Genital warts can enlarge and become friable during pregnancy; therefore, specialists may advocate treatment during pregnancy. In addition, HPV types 6 and 11 can cause respiratory papillomatosis in infants and children. However, small warts are likely to resolve spontaneously after delivery. The presence of genital warts is not indicated for delivery by cesarean section. Cesarean delivery might be indicated for women with genital warts if the pelvic outlet is obstructed or if vaginal delivery would result in excessive bleeding. Pregnant women with genital warts should be counseled concerning the low risk for warts on the larynx (recurrent respiratory papillomatosis) in their infants or children (Silverberg et al. 2003).

## ■ HEPATITIS B VIRUS INFECTION

All pregnant women should be tested for hepatitis B surface antigen (HBsAg), regardless of whether they have been previously tested or vaccinated. HBsAg-negative pregnant women seeking care for STIs who have not been previously vaccinated should receive a hepatitis B vaccination. All HBsAg-positive pregnant women should be referred for assessment and further evaluation. Persistence of HBsAg and absence of anti-HBc IgM antibody for 6 months indicate chronic hepatitis B virus infection. Such patients may develop chronic liver disease and hepatocellular carcinoma and may benefit from antiviral therapy. Household, sexual, and needle-sharing contacts of persons with chronic infection should be investigated for susceptibility HBV infection and commenced on hepatitis B vaccination immediately.

## ■ HEPATITIS C VIRUS INFECTION

Routine testing for HCV infection is not recommended for all pregnant women. Pregnant women with a known risk factor for HCV infection should be offered counseling and testing. Patients should be advised that approximately 5 of every 100 infants born to HCV-infected woman become infected. This infection occurs predominantly during or near delivery, and no treatment or delivery method is known to decrease this risk. The risk is increased by the presence of maternal HCV viremia at delivery and is two to three times greater if the woman is



coinfected with HIV. Breast-feeding does not appear to transmit HCV, although HCV-positive mothers should consider abstaining from breast-feeding if their nipples are cracked or bleeding. Infants born to HCV-positive mothers should be tested for HCV infection and, if positive, evaluated for the presence of CLD.

### ■ PEDICULOSIS PUBIS

Patients who have pediculosis pubis (i.e., pubic lice) usually seek medical attention because of pruritus or because they notice lice or nits on their pubic hair. Pediculosis pubis is usually transmitted by sexual contact.

Pregnant and lactating women should be treated with either permethrin or pyrethrins with piperonyl butoxide; gammabenzene hexachloride (lindane) is contraindicated in pregnancy. Recommended treatment is as follows:

Permethrin 1% cream rinse applied to affected areas and washed off after 10 minutes, OR

Pyrethrins with piperonyl butoxide applied to the affected area and washed off after 10 minutes.

### ■ SCABIES

The predominant symptom of scabies is pruritus. Sensitization to *Sarcoptes scabiei* occurs before pruritus begins. The first time a person is infested with *S. scabiei*, sensitization takes up to several weeks to develop. However, pruritus might occur within 24 hours after a subsequent reinfestation. Scabies in adults frequently is sexually acquired, although scabies in children usually is not.

Treatment of pregnant women with scabies is as follows:

Permethrin cream (5%) applied to all areas of the body from the neck down and washed off after 8 hours.

### ■ KEY POINTS

- Sexually transmitted infections (STIs) pose a threat to the pregnant woman and her fetus and newborn infant.
- Screening tests are available for a large number of STIs, and all pregnant women should be screened for infections during pregnancy.
- Tests that will be carried out will depend on the prevalence of infection in the community that the woman lives in and on availability of laboratory services. Any pregnant woman diagnosed with an STI should be

managed by a multiprofessional team, including obstetrician, genitourinary physician, and pediatrician.

- To prevent adverse pregnancy outcomes and morbidity and mortality, pregnant women found to have infection should be treated promptly.
- Treatment regimes for use in pregnancy need to be safe for the mother and the developing fetus.

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