

Infections of the Genital System

GENITAL TRACT INFECTIONS

In the male, except for some cases of prostatitis and orchitis and the occasional infection of external genitalia by normal skin-infecting organisms, almost all infections of the genital tract are classical sexually transmitted diseases. In the female, though sexually transmitted diseases occur with more or less equal frequency, the majority of genital tract infections are not in this category, though many may be related to sexual activity. The presence of a vaginal discharge is a relatively common event and, in the majority of cases, is not primarily of infectious origin. However, overgrowth of endogenous organisms such as *Candida albicans* can set up a true vaginitis or, in the case of organisms such as *Gardnerella vaginalis*, anaerobes and coliforms, a vaginosis in which organisms colonise epithelial cells or mucus in large numbers, converting an inoffensive discharge into an offensive one. The presence of intrauterine contraceptive devices is associated with overgrowth of endogenous organisms and sometimes with true uterine infection; in the latter case, removal of the device is the essential, and usually the only necessary, treatment. Infections post-partum, post-abortion or post-surgery may resemble post-traumatic and post-surgery infections in other sites. Gynecologic infection constitutes 8% of non-bacteremic infection in older children and adults.

GONORRHOEA (GONORRHEA, BLENNORRHAGIA): Worldwide venereal disease and important cause of neonatal infection; acute or chronic disease of urogenital tract (vulvovaginitis, endocervicitis, urethritis); extension of the disease within the urogenital tract may lead to endometritis, salpingitis, oophoritis, epididymitis, orchitis, spermatozoositis, cystitis; disease may extend to adjacent tissues, giving rise to prostatitis, Bartholinitis, pelvic inflammatory disease, or become systemic; disseminated infection results from bacteremia and often causes petechial or pustular acral skin lesions, asymmetrical arthralgia, tenosynovitis or septic arthritis, occasionally perihepatitis and, rarely, endocarditis or meningitis; subclinical infections (urethral, cervical, anal, pharyngeal) are frequent; eye infections also occur; \approx 6000 notified cases/y in Australia (steady increase); incidence 443/100,000 (1.6-2 M cases/y) in USA (13% of cases in homosexual men); 38% of male sexually transmitted disease, 31% of female; 40% incidence in homosexuals; transmission by mucous membrane contact; incubation period 1-14 d (most symptoms develop within 2-5 d); 0.04% of new episodes of illness in UK; 50-90% of female sexual partners of infected men infected after 1 exposure; once urethritis disappeared, most men not infectious; 20% of men infected after 1 exposure, 60-80% after 4 exposures; 2-50% of infants exposed during birth develop eye infections

Agent: *Neisseria gonorrhoeae*

Diagnosis: women may have no symptoms or vaginal discharge, pain on urination, spotting after sexual intercourse, lower abdominal pain; men: urethral discharge of pus, pain on urination; Gram stain (presence of Gram negative cocci inside polymorphs; sensitivity 90-95%, specificity > 95%) and culture of urethral, cervical, rectal, throat swabs (note that vaginal lubricants are inhibitory and should not be used on speculums, etc); isolates may be identified by biochemistry or DNA hybridisation; PCR or ligase chain reaction if culture not possible (sensitivity > 96%, specificity probably \approx 100%); note possibility of salpingitis (in 10-20% of cases), endometritis, cervicitis, urethritis, Bartholinitis, epididymitis (in up to 20% of infected men without antibiotics); arthritis (85% of disseminated cases), meningitis (5% of disseminated cases), endocarditis (5% of disseminated cases), bacteremia without arthritis (5% of disseminated cases), pericarditis (2% of disseminated cases), abscesses, septic gonococcal dermatitis in complicated cases

Treatment: (since 20-60% coinfecting with *Chlamydia trachomatis*, CDC recommends concurrent treatment for this organism); ceftriaxone 25-50 mg/kg to 250 mg i.m. single dose + (if chlamydial infection not ruled out) azithromycin 1 g orally single dose (> 45 kg) or doxycycline 100 mg orally twice daily for 10 d (\geq 8 y) or erythromycin 50 mg/kg/d divided into 4 doses for 10-14 d (< 8 y); if prevalence of penicillin resistance is low (e.g., Northern Territory, Western Australia), amoxicillin 3 g orally as single dose + probenecid 1 g orally as single dose + azithromycin 1 g orally as single dose

Disseminated Infection:

Neonates: ceftriaxone 25-50 mg/kg/d i.v. or i.m. as single daily dose for 7 d or 10-14 d if meningitis documented, cefotaxime 25 mg/kg/d i.v. or i.m. every 12 h for 7 d or 10-14 d if meningitis documented

Others: ceftriaxone 1 g i.v. every 24 h or cefotaxime 1 g i.v. every 8 h or ceftiozime 1 g i.v. every 8 h

Prevention and Control: exposure prevention; identification and treatment of cases (symptomatic and asymptomatic) and contacts

NON-GONOCOCCAL URETHRITIS (NON-SPECIFIC URETHRITIS): 39% of sexually transmitted disease in male; 3 M cases/y in USA; \approx 14,000 notified cases/y in Australia (\approx 32% in Queensland); 25% incidence in homosexuals, 10% in heterosexuals; transmission by venereal contact; in 1 study, 45% of women and 30% of men whose sexual partners had *Chlamydia* were infected; 60-70% of infants exposed at birth develop respiratory infection or chlamydial ophthalmia; incubation period 7-21 d

Agents: 30-40% *Ureaplasma urealyticum*, 28% *Mycoplasma genitalium*, 15-55% *Chlamydia trachomatis*, 8% *Haemophilus parainfluenzae*, 2% *Haemophilus influenzae*, *Bacteroides*, *Porphyromonas asaccharolytica*, *Prevotella melaninogenica*, anaerobic cocci, *Acinetobacter*, *Staphylococcus aureus*, *Moraxella catarrhalis*, other bacteria in association with urinary tract infection, acute prostatitis, urethral stricture or following instrumentation; *Trichomonas vaginalis* (usually asymptomatic in male), *Candida* (uncommon cause in male), *humanherpesvirus*, *Entamoeba histolytica* described in homosexual males; also trauma

Diagnosis: often asymptomatic; women: vaginal discharge, pain on urination, spotting after sexual intercourse, lower abdominal pain; men: mucopurulent or purulent urethral discharge, dysuria; pyuria (> 10 polymorphs/hpf in sediment from first few mL of freshly voided specimen); Gram stain (> 5 polymorphs per oil immersion field) and culture of urethral swab; leucocyte esterase test on first void urine

Chlamydia:

Males: can cause urethritis and epididymitis; urethral swabs or first void urine specimens may be used for immunofluorescence (sensitivity 40-75%), ELISA (sensitivity 40-75%), PCR (sensitivity > 90%), DNA probe (sensitivity 40-75%), ligase chain reaction (sensitivity > 90%) or culture (sensitivity 50-90%)

Females: 9% of sexually active women under 25 infected; can cause endometritis, cervicitis, Bartholinitis, premature rupture of membranes and preterm delivery; all women 19-24 y and women > 24 y with new partner or multiple partners should be screened annually; cervical swab culture and direct immunofluorescence or ELISA; sensitivity is 70-96% for direct immunofluorescence and 60-96% for ELISA; specimens must contain mucosal epithelial cells (ie., columnar, not squamous); specimens for immunofluorescence may be refrigerated if read within 24 h, must be frozen if not read within 24 hours, and diagnosis should be based on the presence of elementary bodies only, reticular bodies being indistinguishable from bacteria; specimens for immunoassay keep at room temperature for up to 7 d; specificity for both these procedures is 94-99%; culture (McCoy cells or Cellmatics™) is more sensitive than either procedure if urethral swabs are used but gives low yields from urine; iodine staining and immunofluorescence of isolates are equivalent; all these methods are being supplanted by PCR (sensitivity 90%, specificity 99.8%) or ligase chain reaction; VIDAS ELFA also used (sensitivity 71%, specificity 100%, PVP 100%, PVN 98.5%); DNA probe also available; complement fixation test detects antibody to both *Chlamydia trachomatis* and *Chlamydia psittaci*

Treatment:

Chlamydia trachomatis: azithromycin 1 g orally as a single dose, doxycycline 100 mg orally 12 hourly for 7 d, tetracycline 500 mg orally 4 times daily for 7 d, erythromycin base or equivalent salt 500 mg orally 6 hourly for 7 d (can be used in pregnancy), sulphisoxazole or equivalent 500 mg orally 4 times daily for 10 d, ofloxacin 300 mg twice a day for 7 d, levofloxacin 500 mg once daily for 7 d; rescreen 3-4 mo after treatment

Haemophilus: amoxicillin 500 mg orally 8 hourly for 5 d, erythromycin 500 mg orally 4 times daily for 7 d, amoxicillin-clavulanate 500/125 mg orally 8 hourly for 8 d

Ureaplasma urealyticum: erythromycin 500 mg orally 8 hourly for 7 days, minocycline 100 mg orally 12 hourly for 7 days

Mycoplasma genitalium: azithromycin

Treatment Failure: metronidazole 2 g orally in a single dose + erythromycin base 500 mg orally 4 times a day for 7 d or erythromycin ethylsuccinate 800 mg orally 4 times a day for 7 d

Prevention and Control: exposure prevention, treatment of cases

URETHRAL DISCHARGE occurs in 99% of cases of gonococcal urethritis (63% scanty, 78% yellow-green), 95% of non-gonococcal urethritis (96% scanty, 66% clear; *Haemophilus influenzae*: 40% moderate, 40% profuse, 60% clear; *Haemophilus parainfluenzae*: 47% moderate, 88% clear), and in acute epididymitis, acute prostatitis and prostatic abscess

PROSTATITIS AND SEMINAL VESICULITIS: may need to be considered as the cause of protein, mucus and neutrophils (and sometimes bacteria) in urine of males; patients may have relapsing urinary tract infections

Agents: *Neisseria gonorrhoeae*, *Escherichia coli* and other Enterobacteriaceae, *Staphylococcus saprophyticus*, *Mycobacterium avium-intracellulare* (rare; granulomatous), *Haemophilus parainfluenzae*, *Ureaplasma urealyticum*, *Candida albicans* and *Aspergillus* (uncommon cases in hematologic malignancies, diabetes, corticosteroid use, AIDS), *Trichomonas vaginalis*

Diagnosis:

Acute: lower urinary tract symptoms + fever, systemic symptoms, perineal pain, exquisite tenderness of prostate

Chronic: little inflammation, prostate normal on examination; may be recurrent UTIs
culture of semen; quantitative counts of urine, comparing initial voided urine with midstream urine with urine after prostatic massage (or, preferably, ejaculate); semen acid phosphatase elevated for day or more following prostatic massage (in absence of prostatic carcinoma); white cell count usually elevated with neutrophilia

Treatment:

***Mycobacterium avium-intracellulare*:** ethambutol 15 mg/kg orally daily or 25 mg/kg orally 3 times weekly (not < 6 y) + clarithromycin 12.5 mg/kg to 500 mg orally 12 hourly daily or 3 times weekly or azithromycin 10 mg/kg to 500 mg orally daily or 10 mg/kg to 600 mg orally 3 times weekly + rifampicin 10 mg/kg to 600 mg orally daily or 3 times weekly or rifabutin 5 mg/kg to 300 mg orally daily

Other Bacteria:

Severe Acute: amoxy(ampi)cillin 2 g i.v. 6 hourly + gentamicin 4-6 mg/kg (adjust dose for renal function) i.v. daily

Less Severe: cotrimoxazole 160/800 mg orally 12 hourly for 5 days; trimethoprim 240 mg orally daily initially then 80 mg orally daily + rifampicin 900 mg daily initially then 300 mg orally daily; minocycline 200 mg orally initially followed by 100 mg orally 12 hourly; norfloxacin 800 mg/d for 5 d

Chronic: norfloxacin 400 mg orally 12 hourly for 4 w, ciprofloxacin 500 mg orally 12 hourly for 4 w, trimethoprim 300 mg orally daily for 4 w, doxycycline 100 mg orally 12 hourly for 2-4 w

No Organism Isolated: erythromycin 500 mg orally 6 hourly, doxycycline 100 mg orally 12 hourly

Fungi: amphotericin B ± flucytosine; prostatic resection

***Trichomonas vaginalis*:** metronidazole, tinidazole

Prophylaxis (*Mycobacterium avium* complex in HIV/AIDS; CD4 count < 50/μL): azithromycin 1.2 g orally weekly, clarithromycin 500 mg orally 12 hourly, rifabutin 300 mg orally daily

PROSTATIC ABSCESS

Agents: *Staphylococcus aureus* (in younger patients without urinary obstruction), *Escherichia coli* and other Gram negative bacilli (in older patients with prostatic hypertrophy and urinary obstruction), *Candida albicans* (in catheterised diabetics receiving broad spectrum antibiotics), *Neisseria gonorrhoeae*, anaerobes, *Mycobacterium* (rare cases), *Burkholderia pseudomallei* (in 18% of male melioidosis cases)

Diagnosis: pus and bacteria in urine; computerised tomography of pelvis or transrectal ultrasonography; culture of abscess fluid; white cell count usually increased

Treatment: perineal needle drainage or transurethral incision and drainage +:

***Neisseria gonorrhoeae*:** ciprofloxacin

***Burkholderia pseudomallei*:** ceftazidime 2 g i.v. 6 hourly or imipenem 1 g i.v. every 8 h for 2 w, then double strength cotrimoxazole twice daily for at least 3 mo (amoxicillin-clavulanate, doxycycline or fluoroquinolones if unable to tolerate sulphonamides)

Other Bacteria: cotrimoxazole

***Candida albicans*:** amphotericin B

ACUTE EPIDIDYMITIS AND EPIDIDYMOORCHITIS: 0.02% of new episodes of illness in UK

Agents: *Neisseria gonorrhoeae* (22% of cases in heterosexual men, rare in homosexual men), *Chlamydia trachomatis* (46% of cases in heterosexual men, rare in homosexual men), *Escherichia coli* and *Klebsiella pneumoniae* (67% of cases in homosexual men, rare in heterosexual men < 35 y, usual cause in children and heterosexual men > 35 y), *Haemophilus influenzae* (11% of cases in homosexual men, rare in heterosexual men; 5% of cases of non-bacteremic invasive *Haemophilus influenzae* infections in older children and adults), *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Streptococcus*, *Salmonella*, *Treponema pallidum*, *Mycobacterium tuberculosis*, *Brucella* (in 5-9% of brucellosis cases), *Neisseria meningitidis*, *human cytomegalovirus* (in AIDS)

Diagnosis: swelling in 100%, pain in 96%, erythema in 72%, temperature > 37.7° in 40%; white cell count > 10,000/μL in 44%; cloudy urine; Gram stain, immunofluorescence and culture of aspirate, urine, urethral discharge; PCR for *Neisseria gonorrhoeae* and *Chlamydia trachomatis* on intraurethral swab or first void urine; blood and stool cultures; serology; exclude urinary tract infection, testicular torsion

Treatment: infiltration of spermatic cord above testicle with procaine hydrochloride +:

Sexually Acquired: ceftriaxone 250 mg i.m. single dose + doxycycline 100 mg orally twice a day or roxithromycin 300 mg orally daily for 14 d; amoxicillin/clavulanate 500 mg orally 8 hourly for 10-14 d or ciprofloxacin 500 mg orally 12 hourly for 10-14 d or amoxicillin 500 mg orally 8 hourly for 10-14 d + doxycycline 100 mg orally 12 hourly 10-14 d

Associated with Urinary Tract Infection:

Mild to Moderate: trimethoprim 6 mg/kg to 300 mg orally daily for 14 d, cephalexin 12.5 mg/kg to 500 mg orally 12 hourly for 14 d, amoxicillin-clavulanate 12.5/3.1 mg/kg to 500/125 mg orally 12 hourly for 14 d, norfloxacin 400 mg orally 12 hourly for 14 d

Severe: amoxy(ampi)cillin 50 mg/kg to 2 g i.v. 6 hourly + gentamicin (< 10 y: 7.5 mg/kg; ≥ 10 y: 6 mg/kg) i.v. daily (adjust dose for renal function) till substantial clinical improvement then appropriate oral agent to complete 14 d course; ofloxacin 300 mg orally twice a day for 10 d; levofloxacin 500 mg orally once daily for 10 d

Mycobacterium tuberculosis: isoniazid 10 mg/kg to 300 mg orally once daily or 15 mg/kg to 600 mg orally 3 times weekly for 6 mo [+ pyridoxine 25 mg (breastfed baby 5 mg) orally with each dose] + rifampicin 10 mg/kg to 600 mg orally once daily 1 h before breakfast or 15 mg/kg to 600 mg orally 3 times a week for 6 mo + pyrazinamide 25-35 mg/kg to 2 g orally once daily or 50 mg/kg to 3 g orally 3 times weekly for 2 mo (6 mo if not known to be susceptible to isoniazid and rifampicin) + ethambutol 15 mg/kg orally daily (not < 6 y or plasma creatinine > 160 µM/L; regular ocular monitoring) or 30 mg/kg orally 3 times weekly for 2 mo or until known to be susceptible to isoniazid and rifampicin (to 6 mo)

Pseudomonas aeruginosa: gentamicin + ticarcillin

Salmonella: cotrimoxazole 160/800 mg orally 12 hourly

ORCHITIS

Agents: mumps (usually unilateral; in 20-38% of postpubertal males with mumps), coxsackievirus B, Rocky Mountain spotted fever (in 1% of infections), *Salmonella* (in renal transplant recipients), *Chlamydia trachomatis*

Diagnosis: proteinuria; white cell count may be elevated; serology

Treatment: infiltration of spermatic cord just above testis with procaine hydrochloride

Salmonella: cotrimoxazole 160/800 mg orally 12 hourly

Chlamydia trachomatis: doxycycline

BARTHOLINITIS

Agents: wide variety of aerobic and anaerobic bacteria, mycobacteria, *Chlamydia*, fungi, parasites and viruses

Diagnosis: clinical; swab culture

Treatment: dependent on agent

VULVITIS

Agents: *Candida albicans*, *Simplexvirus*

Diagnosis and Treatment: see VAGINITIS, GENITAL HERPES

VAGINITIS: conditions involving actual infections which of themselves may cause discharge and other symptoms

Agents: *Neisseria gonorrhoeae* (prevalence 0-4/1000), *Chlamydia trachomatis* (21% of female sexually transmitted disease), *Trichomonas vaginalis* (worldwide; 19% of female sexually transmitted disease; up to 85% of female sexual partners of infected men infected; 30-40% of male partners of infected women infected; about 5% of girls born to infected women infected at birth; may also be transmitted at gynecological examination; incubation period 3-28 d; 5 M cases/y in USA; prevalence 32-70/1000; amplifies HIV transmission), *human herpesvirus 2* (occasionally *human herpesvirus 1*), *Candida albicans* and other *Candida* species (11% of female sexually transmitted disease; prevalence 36-93/1000; 15-20% *C.glabrata*), *Saccharomyces cerevisiae*, *Haemophilus influenzae*, ? *Mycoplasma hominis*, ? echovirus 4, *Balantidium coli* (extremely rare)

Prepubertal Girls and Elderly Women: *Staphylococcus aureus*, *Streptococcus pyogenes*, other β-streptococci, coliforms, fecal streptococci, *Haemophilus influenzae*, *Actinomyces pyogenes*

Infant Girls: *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Enterobius vermicularis*

Diagnosis: symptoms and signs have little value (vaginal discharge in candidiasis varies from clear and watery to creamy or cottage cheese-like, and occurs in only 55% of trichomoniasis cases, 69% of such discharges being non-frothy leucorrhoea and 12% frothy leucorrhoea); however, a foul odour is more likely to be associated with *Trichomonas vaginalis* or nonspecific or foreign body vaginitis, pruritus is usually intense in *Candida* infections, mild with *Trichomonas vaginalis* and absent or minimal in other conditions, and inflammation is usually intense in candidiasis, obvious in trichomoniasis and minimal in atrophic and foreign body states; pH 5.5-6.0 with *Trichomonas vaginalis*, < 4.5 with *Candida albicans*; wet preparation (motile trichomonads, yeasts, pseudomycelium; using phase contrast, even non-motile trichomonads can be detected, with sensitivity equal to that of culture; sensitivity of ordinary wet mount is only 60%; that of cytology is even less at 55%), Gram stain and culture of vaginal pool found in posterior fornix when patient is in lithotomy position; direct immunofluorescence for *Trichomonas vaginalis* (sensitivity 86%, specificity 99%, PVP 96%, PVN 98%); serology; sticky tape preparation of anal area (children)

Recurrent Candidiasis: associated with pregnancy, uncontrolled diabetes mellitus, estrogens, corticosteroids, ? oral contraceptives, antibiotics, tight-fitting and synthetic clothing (panty hose, underwear), local allergy (commercial douches, perfumes), idiopathic, acquired antigen-specific immunodeficiency (cell-mediated immunity), AIDS, resistance of organism to antimycotic agents, ? switching colonies; culture of swabs from urethra, rectum, fingernails, throat, perineum; skin test; RAST

Treatment:

Neisseria gonorrhoeae:

β-lactamase Negative: amoxicillin 3 g orally as single dose + probenecid 1 g orally as single dose + azithromycin 1 g orally as a single dose or doxycycline 100 mg orally 12 hourly for at least 10 d (pregnant or breastfeeding: erythromycin 500 mg orally twice daily or roxithromycin 300 mg orally once daily for at least 10 d)

β-lactamase Positive or Penicillin Hypersensitive: ceftriaxone 250 mg in 1% lignocaine hydrochloride i.m. as a single dose or spectinomycin 2 g i.m. as a single dose + azithromycin or doxycycline as above (pregnancy or breastfeeding: erythromycin or roxithromycin as above)

Chlamydia trachomatis, Mycoplasma hominis:

Preadolescent Girls: consider sexual abuse as possible cause of chlamydial infection

≤ 45 kg: erythromycin base or ethylsuccinate 50 mg/kg/d orally in 4 divided doses for 14 d

≥ 45 kg but < 8 y: azithromycin 1g orally in single dose

≥ 8 y: azithromycin 1 g orally in single dose, doxycycline 100 mg orally twice a day for 7 d

Pregnant or Breastfeeding: erythromycin base 500 mg orally 4 times daily for 7 d or 250 mg orally 4 times daily for 14 d, amoxicillin 500 mg orally 3 times daily for 7 d, erythromycin ethylsuccinate 800 mg orally 4 times a day for 7 d or 400 mg orally 4 times a day for 14 d, roxithromycin 300 mg orally once daily for 10-14 d

Others: azithromycin 1 g orally as a single dose, doxycycline 100 mg orally 12 hourly for 7-10 d, erythromycin base 500 mg orally 4 times daily for 7 d, erythromycin ethylsuccinate 800 mg orally 4 times a day for 7 d

Streptococci: phenoxymethylpenicillin 10 mg/kg to 500 mg orally 6 hourly for 7 d

Other Bacteria: tetracycline; triple sulpha cream at night

Candida glabrata, Saccharomyces cerevisiae: boric acid 600 mg in gelatin capsule intravaginally 10-14 d (not pregnant), flucytosine

Other Candida: butoconazole 2% cream 5 g intravaginally for 3 d or sustained release 2% cream 5 g single intravaginal application, intravaginal clotrimazole 500 mg pessary once only or 100 mg pessary 2 each night for 3 nights or 1 each night for 6 nights or 1% cream 5g nightly for 6 nights or 2% vaginal cream 1 applicator full for 3 nights or 10% vaginal cream 1 applicator full as single dose at night, miconazole nitrate 2% vaginal cream 5 g nightly for 7 nights or 200 mg vaginal suppository nightly for 3 nights, nystatin 100 000 U pessary or 100 000 U/5 g cream 1 applicatorful inserted high into vagina 12 hourly for 7 d, tioconazole 6.5% ointment 5 g intravaginally once, terconazole 0.4% cream 5 g intravaginally for 7 d or 0.8% cream 5 g intravaginally for 3 d or 80 mg vaginal suppository 1 nightly for 3 nights, fluconazole 150 mg orally single dose (not pregnant); ± clotrimazole 1% cream to vulvovaginal and perianal areas

Recurring or Unresponsive: clotrimazole 500 mg vaginal tablet inserted high into vagina at night, then weekly for 6 mo; fluconazole 50 mg orally daily, then 150-300 mg orally weekly; itraconazole 100 mg orally daily, then 100-200 mg orally weekly; nystatin 100 000 U/5 g vaginal cream 1 applicatorful or 100 000 U pessary intravaginally weekly

Male Partner: nystatin cream locally for 14 d

Multisite Carriage: oral ketoconazole

Hypersensitisation: desensitisation

Anergy: hyperimmune *Candida* transfer factor

Trichomonas vaginalis:

Nonlactating Adults: metronidazole 2 g single oral dose, tinidazole 2 g orally single dose with food, nimorazole 250 mg orally twice a day for 3 d or 2 g single oral dose

Relapse: metronidazole 400 mg orally 12 hourly for 5 d

Lactating Women: interrupt breastfeeding for 24 h after giving metronidazole 2 g orally as a single dose

Children: metronidazole (< 3 y: 1/6 dose; 3-7 y: 1/4 dose; 7-12 years: 1/2 dose)

Simplexvirus: famciclovir 500 mg orally 12 hourly for 7-10 d, valaciclovir 500 mg orally 12 hourly for 7-10 d, aciclovir 200 mg orally 5 times daily for 7-10 d

Frequent, Severe Recurrences: famciclovir 500 mg orally 12 hourly, valaciclovir 500 mg orally 12 hourly, aciclovir 200 mg orally 8 hourly or 400 mg orally 12 hourly

Enterobius vermicularis: pyrinium embonate

VAGINOSIS: conditions in which diminution in numbers of protective hydrogen peroxide-producing Lactobacilli, with excessive overgrowth of endogenous flora, occurs due to physiological or local factors (eg. hormonal effects, sex, douching, IUD, use of some local preparations); associated complications include increased risk of HIV, recurrent cystitis, pelvic inflammatory disease (including

post-abortion and subclinical), cervicitis, abnormal Papanicolaou smears, postsurgical gynecologic infections, early spontaneous abortion, miscarriage after 13 weeks, preterm labour, premature rupture of membranes, chorioamnionitis, postpartum endometritis
Agents: *Prevotella*, *Peptostreptococcus*, *Bacteroides*, *Eubacterium*, *Gardnerella vaginalis*, *Mobiluncus*, *Mycoplasma hominis*, enterococcus, *Streptococcus agalactiae*

Diagnosis: coaty, homogenous, white, non-inflammatory vaginal discharge, pH > 4.5, amine odour with 10% KOH; Gram stain (clue cells with few, or no, lactobacilli) and culture of vaginal swab; DNA probe-based test; card test for detection of elevated pH and trimethylamine; prolineaminopeptidase card test

Treatment: metronidazole 400 mg orally 12 hourly for 7 d, tinidazole 500 mg orally daily for 7 d, nimorazole 250 mg orally twice daily for 3 d, metronidazole gel 0.75% 5 g intravaginally once a day for 5 d, clindamycin phosphate 2% vaginal cream 5 g intravaginally at bedtime for 7 nights, clindamycin 300 mg orally twice a day for 7 d, clindamycin ovules 100 g intravaginally once at bedtime for 3 d; restoration of acid pH with Acigel™ etc

Pregnancy: treatment in early pregnancy reduces preterm birth by 60%; clindamycin 300 mg orally twice daily for 7 d, metronidazole 400 mg orally 12 hourly for 7 d

VAGINAL DISCHARGE also occurs in 28% of cases of *Staphylococcus saprophyticus* urinary tract infection. Nonvenereal vaginal discharge is responsible for 0.7% of new episodes of illness in the UK. Non-infective causes include cervical ectropion; pregnancy; estrogen deficiency (atrophic vaginitis); inflammation due to douches, deodorants, bath salts, perfumes, etc. Syphilis may also present with vaginal discharge.

GENITAL TRACT LISTERIOSIS: usually inapparent disease of genital tract; may be transmitted from pregnant female to offspring either transplacentally or by contact with infected secretions during delivery; hospital infections not uncommon and probably transmitted via hands of nurse

Agent: *Listeria monocytogenes*

Diagnosis: culture of vaginal swab

Treatment: amoxicillin/ampicillin

MUCOPURULENT CERVICITIS

Agents: *Neisseria gonorrhoeae*, *Chlamydia trachomatis*, *Mycoplasma hominis*, *Trichomonas vaginalis*, *Candida albicans*

Diagnosis: Gram stain and culture of cervical swab; direct immunofluorescence (*Chlamydia*) of cytobrush (nonpregnant) or swab

Treatment: see VAGINITIS

NONPURULENT CERVICITIS

Agent: *human herpesvirus 2*, *human adenovirus 37*, *human cytomegalovirus* in AIDS

Diagnosis: viral culture and immunofluorescent stain of cervical swab

Treatment (*human herpesvirus 2*): famciclovir 500 mg orally 12 hourly for 7-10 d, valaciclovir 500 mg orally 12 hourly for 7-10 d, aciclovir 200 mg orally 5 times daily for 7-10 d

Frequent, Severe Recurrences: famciclovir 500 mg orally 12 hourly, valaciclovir 500 mg orally 12 hourly, aciclovir 200 mg orally 8 hourly or 400 mg orally 12 hourly

CERVICAL CARCINOMA: associated with sexual promiscuity (early coitus and multiple sexual partners)

Agent: certain strains of human papillomavirus (HPV-16, HPV-18)

Diagnosis (HPV-16, HPV-18): real time PCR

SALPINGITIS: 0.03% of new episodes of illness in UK

Agents: *Neisseria gonorrhoeae*, *Chlamydia trachomatis*, *Mycoplasma hominis*, *Campylobacter fetus* subsp *fetus*, *Escherichia coli*, *Bacteroides capillosus*, *Bacteroides putredinis*, *Prevotella disiens*, *Actinomyces israelii*

Diagnosis: clinical; Gram stain and culture of endocervical swab, culdocentesis material, material taken at operation; leucocytosis (white cell count > 10,000/ μ L); ultrasound (pelvic abscess or inflammatory complex)

Treatment: doxycycline + benzylpenicillin

TUBO-OVARIAN ABSCESS

Agents: 37% *Escherichia coli*, 22% *Bacteroides fragilis*, 26% other *Bacteroides* species, 19% aerobic streptococci, 17% *Peptostreptococcus*, 11% *Peptococcus*, 7% *Neisseria gonorrhoeae*

Diagnosis: clinical and physical examination; ultrasonography; laparoscopy or laparotomy; culture of needle aspirate or surgical specimen; white cell count > 10,000/ μ L in 75% of cases

Treatment: benzylpenicillin 20 M U/d i.v. in 4 divided doses + gentamicin 3-5 mg/kg/d i.v. in 3 divided doses + clindamycin 2.4 g/d i.v. in 4 divided doses; surgery

OOPHORITIS

Agents: mumps virus, varicella

Diagnosis: serology

Treatment: nonspecific

PERIHEPATITIS

Agents: *Neisseria gonorrhoeae*, *Chlamydia trachomatis*

Diagnosis: culture and immunofluorescence of cervical, urethral and rectal swabs; serology; laparoscopy

Treatment: doxycycline + benzylpenicillin

RAPE: gonorrhoea in 2-28% of victims, syphilis in < 1%, *Chlamydia* in 3-16%, *Trichomonas* in 6-27%, bacterial vaginosis in 12-20%

Investigations: history; physical examination of external genitals, of vaginal aspirate in female children presenting solely because of behavioural symptoms and with no genital abnormalities on external examination, of oral and anal mucosa (evaluate men for relaxed external sphincter, anal fissures and hemorrhoids, ascertain condition of prostate gland and perform proctoscopy if anorectal injury present or infection suspected); complete speculum and bimanual examination in women and female children if external examination shows any genital abnormality or if there is a history of recent vaginal penetration or if child presents with genital symptoms alone rather than with a history of sexual assault (general anesthesia may be necessary); culture or nucleic acid amplification test (confirm with second nucleic acid amplification test targeting different sequence if positive) for *Neisseria gonorrhoeae* and *Chlamydia* from any sites of penetration or attempted penetration, wet preparation and culture of vaginal swab for *Trichomonas vaginalis*, bacterial vaginosis and candidiasis; serology for syphilis, HIV and hepatitis B

Prophylaxis: if assailant is infected, victim is unlikely to return for follow-up or has signs or symptoms of infection, assault by a stranger, or prophylaxis requested by victim; ceftriaxone 250 mg (child: 125 mg) i.v. or i.m. as single dose (spectinomycin 40 mg/kg to 2 g i.m. if allergic to cephalosporins) + azithromycin 20 mg/kg to 1 g orally single dose + metronidazole 30 mg/kg to 2 g orally single dose or tinidazole 50 mg/kg to 2 g orally single dose; hepatitis B vaccine if unvaccinated + hepatitis B immunoglobulin if assailant known to be infected; HIV prophylaxis if unprotected receptive or insertive anal or vaginal intercourse and assailant known or suspected infected (consult HIV physician)

Follow-up: after 7 d, above tests less syphilis serology; after 6 w, syphilis serology

GENITAL ULCERATION

Agents: *Treponema pallidum*, *Haemophilus ducreyi*, *simplexvirus*, *Chlamydia trachomatis*, *Calymatobacterium granulomatis*

Diagnosis and Treatment: serology and darkfield examination or direct immunofluorescence test for *T. pallidum*, culture or antigen test for *simplexvirus*, culture for *Haemophilus ducreyi*; see **SYPHILIS, CHANCROID, GENITAL HERPES, CHLAMYDIAL**

LYMPHOGANULOMA, GRANULOMA INGUINALE

SYPHILIS: a treponematoses; three forms recognised: acquired syphilis, congenital syphilis and nonvenereal syphilis

ACQUIRED SYPHILIS (GREAT POX, LUES, LUES VENEREA, MORBUS GALLICUS, ST JOB DISEASE, ST SEMENT DISEASE):

worldwide; ≈ 2000 notified cases/y in Australia (≈ 42% in Queensland); incidence in USA 2.2/100,000; 3% of male sexually transmitted disease, 2% of female; 15% incidence in homosexuals; transmission by intimate contact with infectious exudates, almost exclusively during sexual contact; 30-60% of sexual partners become infected after 1 exposure; may pass through the placenta as early as ninth week of pregnancy in 2/3 or more of pregnancies, causing spontaneous abortion, stillbirth or neonatal death in 40% of cases; incubation period 10-90 d (mean 21 d); manifested in 3 stages: primary syphilis, secondary syphilis, tertiary syphilis; for public health purposes, it is convenient to classify cases either as early syphilis (covering both primary and secondary stages) or late syphilis

Agent: *Treponema pallidum subsp pallidum*

Diagnosis:

Primary: the initial stage, during which widespread dissemination of *Treponema pallidum* occurs; history of sexual contact often of doubtful reliability; only clinical manifestations are the chancre (dry papule, hard chancre, hard sore, hard ulcer, Hunter chancre, hunterian chancre, primary syphilitic sore, ulcer durum, ulcer induratum)—a hard lesion or painless ulcer on genitalia, perianal area, pharynx, tongue, lips appearing 10-90 d after infection and usually healing spontaneously in 4-6 w—and nontender, rather firm, unilateral regional lymphadenitis (primary syphilitic lymphadenitis); every lump, ulcer or fissure on, in or near the genitalia or anus should be suspected as being possibly primary syphilis; dark ground illumination and direct immunofluorescence of tissue fluid from chancre 3-4 w post-infection; TPHA or ELISA (sensitivity 97-100%, specificity 99.5-100%), quantitative RPR if positive, FTA-ABS if negative and clinical suspicion (all may be negative in AIDS); Western blotting; PCR or ligase chain reaction of lesion, tissue, CSF, blood

Secondary: begins at end of primary syphilis and lasts a few weeks to a year or more; principal manifestations a wide variety of skin lesions—macular, papular, maculopapular, pustular, ulcerative, follicular or nodular rash (syphilids), mucous patches (highly infectious lesions of a mucous membrane; 'snail-track ulcers'), condylomata lata (pale-coloured raised papular lesions, often with a flat surface, most frequently in genital and anal areas)—in ≈ 90%; generalised lymphadenopathy (diffuse, rubbery, symmetric, painless, small inguinal, posterior cervical, occipital, axillary, epitrochlear) in ≈ 85%; headache, fever, arthralgias, sore throat, rhinitis, tearing in ≈ 70%; rare meningismus, aseptic meningitis, cranial nerve involvement, oculopathy (cyclitis, iritis,

choroiditis, retinitis), visceral (hepatitis, pericholangitis, mild nephrotic syndrome, rarely hemorrhagic nephritis), osteochondropathy (usually periostitis of long bones), myositis; any anogenital lump, generalised rash, mouth ulcer, alopecia or generalised lymphadenopathy should be suspected as being possibly due to secondary syphilis; dark ground examination of mucosal or cutaneous lesion; positive VDRL (99% positive) in the presence of positive FTA-ABS (99% positive) or TPHA (96% positive)

Latent: no physical signs; history of syphilis inadequately treated; positive FTA-ABS (96-99% positive) or TPHA (\approx 95% positive); VDRL positive for \approx 75%; CSF negative

Recurrent Secondary Syphilis (Recurring Secondary Syphilis, Secondary Syphilitic Relapse): secondary syphilis, of any form, recurring after a period (of any duration) of latent syphilis

Late (Tertiary): not infectious; 25% of untreated patients asymptomatic (elevated protein, pleocytosis, positive serology of CSF); 6% symptomatic neurosyphilis (5-10 y: neurosyphilis—meningovascular neurosyphilis, characterised by obliterative endarteritis, may cause syphilitic hydrocephalus, meningoencephalitis, seizures, stroke, transverse myelitis; 15-20 y: general paresis (cerebral tabes, syphilitic meningoencephalitis, dementia paralytica, general paralysis of the insane, general progressive paralysis, paralytic dementia, parietic dementia)—generalised meningoencephalitis as a manifestation of neurosyphilis, leading to fibrosis of meninges and atrophy of the brain with ultimately dementia and paralysis; 25-30 y: tabes dorsalis (locomotor ataxia, posterior sclerosis, syphilitic posterior spinal sclerosis, tabetic neurosyphilis)—degeneration of posterior column of spinal cord as a late manifestation of neurosyphilis, complications including Charcot joint resulting from neurotrophic disturbances, and severe gastric functional disturbances with paroxysm ('gastric crisis'); neuritis arising as a manifestation of neurosyphilis most commonly affects the acoustic and optic nerves, the Argyll-Robertson pupil being a classic manifestation); 10% cardiovascular symptoms (mesaortitis with aortic aneurism as possible consequence, endocarditis, pericarditis, aortic valve insufficiency, aortic ectasia particularly ascending aorta, coronary artery stenosis); uncommonly cutaneous (one or more indolent nodules and/or gummata distributed symmetrically) or mucocutaneous; gummata may affect skin, mucous membrane, bone, soft tissue, almost any organ; osteochondropathy affecting cranial bones, tibia, clavicle, fingers, toes, causing bone pain, pathologic fractures, joint destruction, nasal septal and/or palatal perforation; myositis; visceral (most frequently hepatitis, nephropathy)

Late Benign or Cardiovascular: positive FTA-ABS (97% positive) or TPHA (\approx 95% positive) on serum and a normal CSF examination

Neurosyphilis: CSF leucocyte count $>$ 5/mm³; VDRL on CSF (sensitivity 30-70%); if negative, microhemagglutination or FTA-ABS on CSF; if these positive, TPHA index, IgG TPHA ratio, quantitative MHA-TP

Treatment:

Primary, Secondary or Early Latent: benzathine penicillin G 37.5 mg/kg to 1.8 g i.m. as a single dose at once, giving $\frac{1}{2}$ dose into each buttock, followed if possible by 1.8 g after 7 d; aqueous procaine penicillin 1 g i.m. daily for 10 d; treat all sexual contacts within last 3 mo even if RPR negative

Penicillin Hypersensitive: consider desensitisation; doxycycline 100 mg orally 12 hourly for 14 d (not pregnant or breastfeeding)

Human Immunodeficiency Virus Infected Patients: benzylpenicillin 2.4 MU i.v. 4 hourly for 10 d, aqueous procaine penicillin 2.4 MU i.m. daily + probenecid 500 mg orally 6 hourly

Late Latent: benzathine penicillin 37.5 mg/kg to 1.8 g i.m. once weekly for 3 w, procaine penicillin 1 g i.m. once daily for 15 d

Penicillin Hypersensitive: consider desensitisation; doxycycline 100 mg orally 12 hourly for 28 d (not pregnant or breastfeeding)

Tertiary: benzylpenicillin 1.8 g i.v. 4 hourly for 15 d

Cardiovascular Syphilis, Neurosyphilis: + prednisolone or prednisone 20 mg orally 12 hourly for 3 doses

Follow-up:

Primary: serology every 3 mo for 1 y

Secondary, Latent and Late: serology every 3 mo for 1 y, then at 18 and 24 mo

Prophylaxis (Exposure <30 d): procaine benzylpenicillin 2.4-4.8 MU i.m., ceftriaxone 125 mg single dose

Prevention and Control: exposure prevention, identification and treatment of cases

CONGENITAL SYPHILIS: see Chapter 5

NONVENEREAL SYPHILIS (BEJEL (EUPHRATES VALLEY), DICHUCHWA (BOTSWANA), ENDEMIC SYPHILIS, ENDEMIC SYPHILIS OF THE BEDOUINS, NJOVERA (ZIMBABWE), SITI (GAMBIA, SENEGAL), SKERLJEVO OR SKRLEVO (BOSNIA-HERZEGOVINA, MACEDONIA))

AGENT: *Treponema pallidum* subsp. *endemicum*

Diagnosis: similar to **ACQUIRED SYPHILIS** except primary stage often passes unnoticed and more serious late manifestations are rare; all serological tests for syphilis positive; differential diagnosis from acquired syphilis only possible within epidemiological setting

Treatment: as for **ACQUIRED SYPHILIS**

CHANCROID (CHANCRELLE, CHANCRE MOU, CHANCRE SIMPLEX, DUCREY CHANCRE, DUCREY DISEASE, GENITAL ULCER, SIMPLE CHANCRE, SOFT CHANCRE, SOFT SORE, ULCUS MOLLE): worldwide; acute, sexually transmitted infectious disease of the genitalia; people infectious as long as they have ulcers; no transmission from mother to fetus or during delivery; rare cases in Australia; \approx 700 cases/y in USA; incubation period 1-10 d (usually 3-7 d); found in 15% of primary syphilitic chancres and 28% of patients with herpes genitalis

Agent: *Haemophilus ducreyi*

Diagnosis: women may have no symptoms; 1 or more painful pustular lesions, at entrance to vagina and around anus in women and on penis in men, that may rupture to form suppurative ulcers; women may have pain on urination or defecation, rectal bleeding, pain on intercourse or vaginal discharge; regional lymphadenopathy (inguinal adenitis with softening appearing after 7-10 d) in up to $\frac{1}{2}$ of cases; microscopy (characteristic arrangement of bacteria) and culture (high humidity at 33-35°C on enriched gonococcal agar + 1% bovine hemoglobin + 5% serum and on Muller-Hinton agar + 5% chocolate horse blood, repeating culture on first medium at 48 h) of swab of lesion or aspirate from flocculant node (sensitivity 92%; negative cultures 38% prior medication, 38% syphilis, others?); occasionally, a biopsy may be required; tests for syphilis and *simplexvirus* virus negative

Treatment (Patients and Sexual Partners): ulcers disappear without treatment usually in about a month but may last up to 12 w; azithromycin 1 g orally as single dose (not in pregnant or breastfeeding), ceftriaxone 250 mg i.m. as a single dose, ciprofloxacin 500 mg twice a day orally for 3 d (not in pregnant or lactating women), erythromycin 500 mg orally 8 hourly for 7 d, cotrimoxazole 160/800 mg orally 12 hourly for minimum 10 d, tetracycline 500 mg orally 6 hourly for 14-21 d, sulphisoxazole 1 g orally 6 hourly for 10 d, amoxicillin-clavulanate 500/125 mg 8 hourly for 7 d, rosoxacin 450 mg 12 hourly orally for 3 d; reexamine 3-7 d after initiation of therapy; incision and drainage of buboes if required

Prevention and Control: exposure prevention

GENITAL HERPES: 5% of sexually transmitted disease in male, 4% in female; 0.2-0.5 M cases/y in USA (20% seroprevalence in > 12 y old; 30% increase in past decade); 10% incidence in homosexuals; 30/100,000 physician's visits; 17% of women and 4% of men infected when living with infected partner for median 344 d; > 90% of persons with genital *simplexvirus* 2 shed virus asymptotically; incubation period 1-26 d (average 6-7 d)

Agent: *simplexvirus* (up to 30% *simplexvirus* 1 (recurrences much less frequent), remainder *simplexvirus* 2)

Diagnosis: 60% unrecognised with symptoms, 20% recognised genital herpes, 20% truly asymptomatic; painful, multiple, blisterlike, ulcerating lesions in and around vagina, around anus or on thighs in women or on penis in men; can cause vulval/perianal fissures, internal lesions, reddening on buttocks/thighs, painful urination, vaginal/urethral discharge, aching lower limbs, headache, radicular or lower back pain, fever, malaise, stiff neck, abnormal sensitivity to light; may mimic cystitis, candidiasis or prostatitis; can lead to cervicitis and proctitis; $\frac{1}{2}$ of those infected have recurrences, involving smaller and fewer lesions and less severe systemic reactions, though pain, numbness or tingling in buttocks, legs or hips may precede outbreak; immunofluorescence, viral culture (Cellmatics™ mink lung cells most useful cell line for isolation and typing; if other viruses also sought, MRC-5 is probably the most suitable cell line; virus isolated from cervix in 70-90% of primary, but only 30-50% of recurrent, cases), Tzanck preparation (insensitive and nonspecific), ELISA (antigen and antibody; commercial systems inaccurate or misleading regarding virus type), PCR (100% specificity, greater sensitivity than culture), electron microscopy, Western immunoblot assay (type specific; sensitivity and specificity \approx 100%), glycoprotein G-2 immunoblot assay (type specific; sensitivity 80-98%, specificity \geq 96%)

Treatment: paint with povidone iodine 6 times daily for 7 d; famciclovir 500 mg orally 12 hourly for 5 d, valaciclovir 500 mg orally 12 hourly for 5 d, aciclovir 400 mg orally 8 hourly for 5 d (preferred in pregnancy); lignocaine 2% jelly may be used in first 24-36 h for pain relief

Infrequent, Severe Recurrences: commence at onset of prodromal symptoms or within 1 d of lesion onset; aciclovir 400 mg orally 8 hourly for 5 d (preferred in pregnancy), famciclovir 1 g orally for 1 d or 125 mg orally 12 hourly for 5 d or 500 mg orally 12 hourly for 7 d (in immunocompromised), valaciclovir 500 mg orally 12 hourly for 3 d

Frequent, Severe Recurrences: famciclovir 250 mg (500 mg in immunocompromised) orally 12 hourly for up to 6 mo, valaciclovir 500 mg orally 12 hourly (in immunocompromised) or 500 mg orally daily (< 10 recurrences per year on suppressive therapy) or 1 g orally daily (> 10 recurrences per year on immunosuppressive therapy) for up to 6 mo, aciclovir 200 mg (400 mg in late pregnancy) orally 1 hourly for up to 6 mo

CHLAMYDIAL LYMPHOGRANULOMA (BENIGN INGUINAL LYMPHOGRANULOMATIS, CLIMATIC BUBO, DURRANT-NICHOLAS-FARRE DISEASE, FREI DISEASE, INGUINAL LYMPHOGRANULOMATIS, LYMPHOGRANULOMA INGUINALE, LYMPHOGRANULOMA INGUINALIS, LYMPHOGRANULOMA TROPICUM, LYMPHOGRANULOMA VENEREUM, LYMPHOMA INGUINALE, LYMPHOMATOSIS INGUINALES SUPPURATIVA SUBACUTA, LYMPHOPATHIA VENEREA, LYMPHOPATHIA VENEREUM, NICHOLAS-FARRE DISEASE, PORADENITIS INGUINALIS, PORADENITIS NOSTRAS, PORADENITIS VENEREA, PORADENOLYMPHITIS, PORADENOLYMPHITIS NOSTRAS, PORADENOLYMPHITIS SUPPURATIVA, SUPPURATIVE INGUINAL ADENITIS, TROPICAL BUBO, VENEREAL LYMPHOGRANULOMA, VENEREAL LYMPHOPATHY): principally tropical countries, including Australia (last notified case in 1995); incidence 0.09/100,000 in USA; < 1% of sexually transmitted disease; transmission by venereal contact; probably less transmissible than gonorrhoea; incubation period 3-12 d for genital lesion, 10-30 d for inguinal bubo

Agent: *Chlamydia trachomatis* L1-L3 serovars

Diagnosis: transient small papule (cutaneous or mucosal), subsequent slowly suppurating, tender inguinal and femoral buboes (most commonly unilateral) and lymphadenopathy, often with microabscess formation; women and homosexual men have no symptoms or lower abdominal or back pain, proctocolitis or inflammatory involvement of perirectal or perianal lymphatic tissues resulting in fistulas or strictures; 20-30% of women have inguinal buboes; systemic symptoms; anal intercourse may lead to rectal infection; 2/3 of buboes shrink and form fibrous masses, 1/3 rupture and leave scars; may be anorectal and/or vulvar lesions and genito-anorectal strictures (esthiomène) as a manifestation of chronic stage; prostatitis has been described as a subacute phenomenon; in 20%, inguinal lymph nodes separate from femoral lymph nodes to form inguinal groove; other sequelae include fistula, chronic inflammation of lymph nodes, cervicitis, urethritis and enlargement of genitalia; cytology and microimmunofluorescence of pus or biopsy; serology (complement fixation titres

≥ 1:64); dark ground illumination, tests for *Haemophilus ducreyi* and acid-fast bacilli negative; skin test (Frei test); white cell count 20,000/ μ L

Treatment: doxycycline 100 mg orally twice daily for 21 d (not in pregnant or breastfeeding), roxithromycin 300 mg orally daily for 21 d, azithromycin 1 g orally weekly for 3 w (not in pregnant or breastfeeding), erythromycin 30 mg/kg to 500 mg 4 times a day for 21 d; aspiration of infected buboes; surgical treatment of strictures

Prevention and Control: exposure prevention, treatment of cases

GRANULOMA INGUINALE (CHRONIC VENEREAL SORES, DONOVANIASIS, DONOVANIOSIS, FIFTH VENEREAL DISEASE, GRANULOMA CONTAGIOSA, GRANULOMA GENITO-INGUINALE, GRANULOMA INGUINALE TROPICUM, GRANULOMA PUDENDI, GRANULOMA PUDENDI TROPICUM, GRANULOMA VENEREUM, GRANULOMA VENEREUM GENITO-INGUINALE, INFECTIVE GRANULOMA, LUPOID FORM OF GROIN ULCERATION, PUDENDAL ULCER, SCLEROSING GRANULOMA, SERPIGINOUS ULCERATION OF THE GENITALS, SERPIGINOUS ULCERATION OF THE GROIN, ULCERATING GRANULOMA OF THE GENITALS, ULCERATING GRANULOMA OF THE PUDENDA, ULCERATING SCLEROSING GRANULOMA, VENEREAL GRANULOMA): a chronic mucocutaneous disease; endemic in India, Papua New Guinea, central Australia, southern Africa; 16 notified cases in Australia (tropical and near tropical areas) in 1999, showing steady decrease from 119 notified cases in 1994; incidence 0.02/100,000 in USA; usually transmitted by sexual contact; incubation period 8-80 d

Agent: *Klebsiella granulomatis*

Diagnosis: women may have no symptoms; painless, spreading, ulcerating, granulomatous lesions of genitalia (usually labia, prepuce or glans) and adjacent areas (extragenital lesions uncommon); lesion is covered by beefy-red granulation tissue and has raised-rolled, but not undermined, margins, and bleeds easily on contact; without treatment, may erode genitalia or block urethra; no regional lymphadenopathy; Giemsa stain of tissue scrapings from granuloma or aspirate from enlarged lymph glands ('Donovan bodies' seen in cytoplasm of mononuclear cells); precipitin and complement fixation tests

Treatment:

Not Pregnant or Breastfeeding: azithromycin 500 mg orally once daily for 7 d or 1 g orally once weekly for 4 w or until healing occurs, doxycycline 100 mg orally 12 hourly or 200 mg orally daily for 3-6 w, cotrimoxazole 160/800 mg orally 12 hourly for 3-6 w, chloramphenicol 500 mg orally 6 hourly for 2-6 w (average total dose required may reach 33.6 g in Papua New Guinea), gentamicin 1 mg/kg i.v. 8 hourly for up to 21 d, ciprofloxacin 750 mg orally 4 times a day for at least 3 w

Pregnant or Breastfeeding: erythromycin 500 mg orally 6 hourly for 3-6 w, roxithromycin 300 mg orally once daily for 2-6 w

Prevention and Control: exposure prevention

VENEREAL WARTS (CONDYLOMATA ACUMINATA): 20% incidence in homosexuals

Agent: human papillomavirus (types 6 and 11 > 90%)

Diagnosis: cytology

Treatment:

Vaginal: cryotherapy with liquid nitrogen; bichloroacetic acid or trichloroacetic acid 80-90% weekly

Urethral: cryotherapy with liquid nitrogen, podophyllin 10-25% in compound tincture of benzoin weekly

Anal: cryotherapy with liquid nitrogen, trichloroacetic acid or bichloroacetic acid 80-90% weekly, surgical removal

Oral: cryotherapy with liquid nitrogen, surgical removal

Others: podofilox 0.15% cream or 0.5% solution or gel topically twice daily for 3 consecutive days each week for 4-6 w until warts disappear (not pregnant or breastfeeding); imiquimod 5% cream topically once daily at bedtime and washed off after 6-10 h 3 times a week for up to 16 w (not pregnant or breastfeeding); cryotherapy repeated every 1-2 w until resolved; podophyllin resin 25% in compound tincture of benzoin topically and washed off after 6 h weekly until warts disappear (not pregnant); trichloroacetic acid or bichloroacetic acid 80-90% weekly; electrosurgery; surgical removal; intralesional interferon; laser surgery

Note: human papillomavirus 16 and 18 cause 70% of cervical cancers; they may be detected by PCR or dot-blot; 13 other high risk types cause the remainder; all high risk types can (uncommonly) cause penile intraepithelial neoplasia; types 16 and 18 also cause 25% of low-grade squamous intraepithelial lesions, while types 6 and 11 cause 5-25%; types 6 and 11 do not cause cervical cancer

ERYTHROPLASIA OF QUEYRAT: carcinoma in situ of penis

Agent: human papilloma virus 16

Diagnosis: cytology

Treatment: 5% imiquimod cream

MOLLUSCUM CONTAGIOSUM: benign cutaneous viral disease

Agent: *molluscum contagiosum virus* (poxvirus)

Diagnosis: cytology

Treatment: derroof aseptically with a needle or sharp pointed stick and express contents or treat as for warts

BALANITIS

Agents: superficial skin infection with *Staphylococcus aureus*, *Streptococcus pyogenes*, overgrowth of normal skin organisms due to poor hygiene; balanoposthitis due to *Candida*, *Bacteroides*, *Porphyromonas asaccharolytica*, *Prevotella melaninogenica*, anaerobic cocci, *Treponema* species other than *Treponema pallidum* subsp *pallidum* and *Treponema pallidum* subsp *pertenue* (may be acute ulcerative necrotising (Corbus disease, corrosive balanitis, erosive balanitis, fourth venereal disease, ulcerative balanoposthitis, venereal balanitis); severe tissue destruction may result and gangrene (balanitis gangrenosa, gangrenous balanitis, specific and ulcerative balanoposthitis) may occur), *simplexvirus*, *Neisseria gonorrhoeae*, *Trichomonas vaginalis*; circinate balanitis in Reiter's syndrome

Diagnosis: inflammation of the glans penis ± inflammation of prepuce; culture of swab

Treatment: cleaning with normal saline

Candida: clotrimazole 1% + hydrocortisone 1% cream topically 12 hourly or miconazole 2% + hydrocortisone 1% topically twice daily for 2 w after symptoms resolve; screen for diabetes; consider circumcision in extreme recurrent relapsing

Sexually Transmitted Diseases: see relevant sections

Staphylococcus: di(fluc)loxacin 12.5 mg/kg orally or i.v. 6 hourly for 5-7 d

Streptococcus pyogenes: phenoxymethylpenicillin 10 mg/kg to 500 mg orally 6 hourly for 10 d

Other Bacteria: erythromycin orally 12 hourly for 5-7 d, roxithromycin orally once daily for 5-7 d