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OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

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Pediatrics 2001;107;562-573
DOI: 10.1542/peds.107.3.562

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American Academy of Pediatrics

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Contraception in the Adolescent: An Update

Donald E. Greydanus, MD*; Dilip R. Patel, MD*; and Mary Ellen Rimsza, MD‡

ABSTRACT. Contraception remains an important part of national efforts to reduce adolescent pregnancy in the United States. A number of safe and effective contraceptive methods are available for our youth, including abstinence, barrier methods, oral contraceptives, Depo-Provera, and Norplant. Research over the past few decades has resulted in a variety of oral contraceptives with reduced amounts of hormones and reduced side-effects. A number of methods have received approval by the Food and Drug Administration since the last review in 1980, including emergency contraceptives, depomedroxyprogesterone acetate, and the cervical cap. The use of condoms and vaginal spermicides continues to be recommended for all sexually active adolescents to reduce (not eliminate) the risk for acquiring sexually transmitted diseases. A polyurethane condom is now available, in addition to the latex condom and other barrier contraceptives, including the following: diaphragm, cervical cap, vaginal sponge, female condom and vaginal spermicides. Because of continuing concerns about pelvic inflammatory disease related to intrauterine devices, currently available intrauterine devices are not recommended for most adolescents. Abortion is not considered as a contraceptive method. *Pediatrics* 2001;107:562–573; *abstinence, oral contraceptives, barrier contraceptives, Depo-Provera, Norplant.*

ABBREVIATIONS. OCP, oral contraceptive pill; IUD, intrauterine device; STD, sexually transmitted disease; FDA, Federal Drug Administration; LH, luteinizing hormone; WHO, World Health Organization; HIV, human immunodeficiency virus; VTE, venous thromboembolism; BTB, breakthrough bleeding; POP, progestin-only pill; ECP, emergency contraceptive pill; DMPA, depo-medroxyprogesterone acetate.

Millions of American teenagers are sexually active and in need of effective contraception.¹ Twenty-one years ago, *Pediatrics* provided an overview of contraception.² This article will summarize current issues regarding contraception and youth, reviewing the changes that have occurred over the past 2 decades. It also encourages clinicians who care for adolescents to consider these concepts of contraception, because many teenagers may not be motivated to practice abstinence. Respect for the

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youth's moral and religious beliefs is also recommended.

There are many types of contraceptives available (Table 1), but most youth who choose hormonal contraception will select the oral contraceptive pill (OCP).^{3–9} The most effective contraceptive methods are the injectable hormonal contraceptives (Depo-Provera, Norplant). The comparative failure rates of contraceptives are as follows: Depo-Provera and Norplant, 0.4%; intrauterine device (IUD), 0.5–0.7%; OCPs, 3.0%; condom, 12.0%; diaphragm, 18%; and vaginal foam, 21%.⁴ The comparative cost of contraceptives is \$25 to \$30 for 1 month of oral contraceptive pills, \$30 to \$50 for a single intramuscular dose of Depo-Provera, and an initial cost of \$400 to \$600 for the insertion and removal of Norplant. Condoms always should be recommended in addition to other contraceptive methods because correctly used, condoms increase contraceptive efficacy and offer significant protection from sexually transmitted diseases (STDs).^{1–5}

Sexually active adolescents should understand the benefits and limitations of the various contraceptive methods. The efficacy of contraceptive methods can be improved if these youth have access to a health care professional who will provide appropriate education in conjunction with contraceptive prescription. Questions regarding contraceptive side effects must be acknowledged, and accurate information provided. Contrary to popular belief, a pelvic examination is not necessary when a contraceptive is prescribed, especially if it will delay the sexually active adolescent's access to needed birth control measures. It is always important to match the method with the

TABLE 1. Contraceptive Methods

- A. Abstinence
- B. Oral contraceptives
 1. Combined (estrogen and progestin)
 2. Mini-pills (progestin-only pills; POPs)
- C. Emergency contraceptives
- D. Barrier contraceptive methods
 1. Diaphragm
 2. Vaginal sponge
 3. Cervical cap (Prentif Cavity-rim)
 3. Female condom (Reality)
 4. Vaginal spermicides
 5. Male condom
- E. Injectable contraceptives
 1. Depomedroxyprogesterone acetate (Depo-Provera)
 2. Levonorgestrel implant (Norplant)
- F. IUD
 1. Progestasert IUD (with progesterone)
 2. ParaGard (Copper T380A IUD)
- G. Periodic abstinence

specific adolescent's choice. Careful follow-up is recommended to improve contraceptive compliance, recognizing that the specific contraceptive needs of youth often vary over time.

Abstinence

Abstinence or postponement of sexual activity always can be suggested and encouraged, stressing that this is the most efficacious method of preventing pregnancy and STDs.¹⁰ A clear discussion is important, reviewing safe sexual behavior with the adolescent (eg, holding hands, kissing, fondling), avoiding high risk situations (eg, using drugs, being in a private place), practicing how to say no to sexual advances, and encouraging the adolescent to discuss with her (his) partner what sexual activity is off limits. Youth who are coitally experienced can be encouraged to postpone additional sexual activity until later in their lives (secondary abstinence). The adolescent can be assured that abstinence is normal, common, and acceptable, and there are other ways of demonstrating affection besides sexual behavior.

Oral Contraception: The Combined Pill

There have been changes in the formulation of oral contraceptives over the past 4 decades. The estrogen content of OCPs has decreased, triphasic pills with a reduced total amount of progestin content per cycle

have been introduced, and new forms (third generation) of progestins have been developed. The pill has been shown to be a safe and effective contraceptive, especially for the adolescent age group.^{4,8} There are many brands of oral contraceptives used throughout the world that generally contain both synthetic estrogen and progestin. In the United States, birth control pill brands contain 20, 30, 35, or 50 μg of ethinyl estradiol as the estrogen; mestranol is now rarely used (Table 2).

Several different progestins are used: ethynodiol diacetate, norethindrone acetate, norethindrone (first generation); norgestrel, levonorgestrel (second generation); and desogestrel, norgestimate, and gestodene (third generation). Gestodene is not available in the United States. Compared with the older progestins, the newer third generation progestins have the same contraceptive efficacy, ability to regulate the menstrual cycle, and incidence of break-through bleeding. These newer progestins may have a lower incidence of acne vulgaris and hirsutism, while having the same effect on blood coagulation parameters as the older progestins.^{11,12} OCPs in general improve acne vulgaris; 1 brand, Ortho Tri-Cyclen, has been approved by the Federal Drug Administration (FDA) for treatment of acne since 1997.

Combined oral contraceptives prevent ovulation by inhibiting gonadotropin-releasing hormone lead-

TABLE 2. Oral Contraceptives

Name	Estrogen (μg)	Progestin (mg)
Mini-pill (POPs)		
Micronor		Norethindrone, 0.35
Nor-Q.D.		Norethindrone, 0.35
Ovrette		Norgestrel, 0.075
Monophasic OCPs		
Alesse	Ethinyl estradiol, 20	Levonorgestrel, 0.10
Levlite	Ethinyl estradiol, 20	Levonorgestrel, 0.10
Loestrin 1/20	Ethinyl estradiol, 20	Norethindrone acetate, 1.0
Desogen	Ethinyl estradiol, 30	Desogestrel, 0.15
Ortho-Cept	Ethinyl estradiol, 30	Desogestrel, 0.15
Loestrin 1.5/30	Ethinyl estradiol, 30	Norethindrone acetate, 1.5
Lo/Ovral	Ethinyl estradiol, 30	Norgestrel, 0.3
Nordette	Ethinyl estradiol, 30	Levonorgestrel, 0.15
Levlen	Ethinyl estradiol, 30	Levonorgestrel, 0.15
Ovcon 35	Ethinyl estradiol, 35	Norethindrone, 0.4
Brevicon	Ethinyl estradiol, 35	Norethindrone, 0.5
Modicon	Ethinyl estradiol, 35	Norethindrone, 0.5
Norinyl 1+35	Ethinyl estradiol, 35	Norethindrone, 1.0
Ortho-Novum 1/35	Ethinyl estradiol, 35	Norethindrone, 1.0
Ortho-Cyclen	Ethinyl estradiol, 35	Norgestimate, 0.250
Demulen1/35	Ethinyl estradiol, 35	Ethinodiol diacetate, 1.0
Demulen1/50	Ethinyl estradiol, 50	Ethinodiol diacetate, 1.0
Norinyl 1+50	Mestranol, 50	Norethindrone, 1.0
Ortho-Novum 1/50	Mestranol, 50	Norethindrone, 1.0
Ovcon 50	Ethinyl estradiol, 50	Norethindrone, 1.0
Ovral	Ethinyl estradiol, 50	Norgestrel, 0.50
Multiphasic OCPs		
Estrostep	Ethinyl estradiol (20-30-35)	Norethindrone acetate (1.0)
Jenest	Ethinyl estradiol, 35	Norethindrone (0.5;1.0)*
Mircette	Ethinyl estradiol, 20**	Desogestrel, 0.15
Ortho-Novum 7/7/7	Ethinyl estradiol, 35	Norethindrone (0.5, 0.75, 1.0)
Tri-Norinyl	Ethinyl estradiol, 35	Norethindrone (0.5, 1.0, 0.5)
Triphasil	Ethinyl estradiol (30-40-30)	Levonorgestrel (0.05, 0.075, 0.125)
Tri-Levlen	Ethinyl estradiol (30-40-30)	Levonorgestrel (0.05, 0.075, 0.125)
Ortho Tri-Cyclen	Ethinyl estradiol (35)	Norgestimate (0.180, 0.215, 0.250)

* Varies norethindrone: 0.5 mg for 7 days and 1.0 mg for 14 days.

** 21 days of ethinyl estradiol at 20 μg , 5 days at 10 μg (with no progestin), and 2 placebo days.

ing to follicle-stimulating hormone and luteinizing hormone (LH) inhibition. Other secondary mechanisms by which OCPs provide contraception include progestin-induced changes (eg, thickening in cervical mucus viscosity, endometrial atrophy, and changes in the tubal transport mechanism). If the OCP is used correctly, the failure rate is <1%; however, a more typical failure rate is approximately 3% in adults, and 5% to 15% in adolescents.^{4,9}

Unfortunately, adolescents are less compliant with OCPs than adults, for various reasons. First, they may be ambivalent about using contraception; second, they have greater difficulty taking any pill on a regular basis; and third, they may lack adequate education about the pill, and thus have heightened concerns over various side effects. Some of these concerns include the risk of weight gain, blood clots, cancer, sterility, increased blood pressure, growth impairment, hirsutism, depression, and birth defects. Many of these concerns are the result of reports from the 1960s when high dose pills were used. Over half (45%–66%) of adolescents will stop taking the pill during the first year of use.¹² Careful education about the pill, selection of specific pill brands, and follow-up by the clinician can improve pill compliance and lower failure rates.

Oral contraceptives may be categorized as either monophasics, which contain a constant amount of hormones, or multiphasics, which vary the amount of progestin, and sometimes estrogen, over the course of a 21-day cycle.⁵ The multiphasics (also called triphasics) offer no significant advantage over monophasic pills.

Current recommendations are to begin with a monophasic pill which has 20, 30, or 35 μg of estrogen and 0.15 to 1.5 mg of progestin or a multiphasic pill. The use of low estrogen and low progestin amounts in contraceptives has markedly reduced pill-associated complications. It is recommended to start the OCP on the first menstrual day, although some clinicians suggest beginning either on day 5 of the cycle or on the Sunday after the menstrual bleeding starts.⁴ A 28-day pill packet is usually recommended, with 21 days of hormones and 7 days of placebo. A 21-day pill packet will be more confusing for the adolescent and may decrease compliance. The majority of currently available OCPs consist of 21 days of hormonal pills followed by 7 days of placebo per 28 day cycle.

Some newer OCPs have been introduced that have only 2 placebo days per 28 day cycle. These OCPs are equally effective and contain lower total amounts of hormones per cycle. To reduce errors in pill-taking and improve compliance, pill packets are being introduced in which the OCP dialpack dispenser has each pill numbered and turns only in 1 direction. Also, teens should be advised that oral contraceptives are only effective if taken regularly and another method of contraception should be used if >2 consecutive pills are missed in any menstrual cycle. In addition, sexually active adolescents always should be advised to use condoms, even while taking OCPs.

Medical Eligibility Criteria

Careful education, monitoring, and selection of patients for OCP use will reduce complications. Sexually active youth who have various medical conditions are also in need of effective, safe contraception.¹³ An important role of clinicians is to determine if a specific medical disorder or condition represents too great a risk for OCP use. Recently, the World Health Organization (WHO) has developed a list of revised guidelines to help determine medical eligibility for OCP prescription.¹⁴ A careful review of existing literature was used to develop these WHO guidelines, in which the risks of pregnancy for the mother and offspring were considered in the context of OCP use in females with various medical disorders. Four classifications (1–4) were identified to help the clinician in this regard.

WHO Category 1 lists conditions where there are no restrictions for OCP use. These include mild headaches, benign breast disease, obesity, pelvic inflammatory disease, thyroid disorders (eg, hypo/hyperthyroidism, simple goiter), epilepsy, iron deficiency anemia, use of antibiotics, dysmenorrhea, endometriosis, various infections (malaria, tuberculosis, schistosomiasis, STDs, including human immunodeficiency virus [HIV]), increased STD risk, vaginitis without purulent cervicitis, viral hepatitis carrier, cervical ectropion, irregular menstrual bleeding, history of ectopic pregnancy, abortion or postabortion after first or second trimester, postpartum at or over 21 days, varicose veins, history of gestational diabetes, ovarian or endometrial cancer, family history of breast cancer, gestational trophoblastic disease (benign or malignant), benign ovarian tumors, or past pelvic surgery.¹⁴

WHO Category 2 includes conditions in which caution is suggested in OCP prescription, but the advantages (ie, pregnancy prevention) usually outweigh potential disadvantages. These conditions include sickle cell disease or sickle C disease, hypertension at 140 to 159/100 to 109 mm Hg, cervical cancer, undiagnosed breast mass, major surgery without prolonged immobilization, and uncomplicated diabetes mellitus (see below). Severe headaches are also included in this category even if they start after beginning OCPs, as well as migraine headaches without focal neurologic involvement. Patients who have difficulty taking OCPs correctly are also listed in the WHO Category 2, including those who have mental retardation, persistent history of poor compliance, drug or alcohol abuse, and severe psychiatric disorders.

WHO Category 3 includes conditions for which OCPs are usually not used unless there are no other contraceptives methods available and/or acceptable because of the increased risk of complications. These conditions include the female who is <21 days postpartum, lactating (6 weeks–6 months), has gallbladder disease, is on medications which may interfere with OCP efficacy, or has undiagnosed abnormal vaginal/uterine bleeding.

WHO Category 4 includes conditions for which OCPs should not be used. These include the female

with current or past history of deep vein thrombosis or pulmonary embolism, cerebrovascular accident, or coronary (or ischemic) heart disease, complicated structural heart disease (eg, pulmonary hypertension, atrial fibrillation or history of subacute bacterial endocarditis), pregnancy, lactation <6 weeks postpartum, complicated diabetes mellitus (eg, retinopathy, neuropathy, nephropathy), breast cancer, headaches (including migraine headaches) with focal neurologic symptoms, liver disease (including liver cancer, benign hepatic adenoma, active viral hepatitis, severe cirrhosis), surgery involving the lower extremities and/or prolonged immobilization and severe hypertension (160+/100+ mm Hg or with vascular complications). A number of specific conditions are now considered.

Cardiovascular Complications

Past or current use of low-estrogen OCPs does not adversely affect the risk of myocardial infarction, ischemic stroke, or hemorrhagic stroke in women with no other risk factors. OCP use does increase the risk for venous thromboembolism (VTE) threefold to fourfold; however, the increased risk is still approximately half of that associated with pregnancy. The WHO Scientific Group on Cardiovascular Disease and Steroid Hormone Contraception recently concluded that OCPs containing desogestrel or gestodene probably carry a small increased risk (1.5–2.7 times) for VTE compared with OCPs containing levonorgestrel.¹⁵ However, study investigators suggested that several potential biases could explain these results, including diagnostic bias, referral bias, prescription bias, and attrition of susceptibles.^{15–18} In young women, there is no excess attributable risk of death from cardiovascular disease related to OCP use.¹⁶ OCPs should be stopped before surgery or situations that result in prolonged bed rest.

There is a greater risk of VTE in patients who have conditions that increase the risk for thrombosis (eg, past history of VTE, prolonged immobilization, thrombophilic disorder). Thrombophilic disorders include factor V Leiden mutation and hereditary deficiencies of antithrombin, protein C, and protein S. The risk of VTE is increased most for patients who have factor V Leiden mutation, which is present in approximately 5% to 7% of the population and in 20% to 40% of patients presenting with VTE.¹⁹ The relative risk for VTE in women who have this mutation is approximately 35 for OCP users compared with nonusers. However, the absolute risk is approximately 3 additional cases per 1000 users with the mutation compared with those users who do not have defective factor V. Thrombotic risk is not increased in protein S-deficient women and only slightly increased in protein-C deficient women. Antithrombin deficiency increases the risk of VTE somewhat less than factor V Leiden (relative risk is 27). Broad-based screening for thrombophilic disorders before OCP prescription is currently not recommended, but testing may be prudent for women who have a strong family history of VTE. Factor V Leiden mutation is the most common genetic cause of thrombophilia and has the highest relative risk for

VTE; thus, if screening is done, it should include screening for this mutation.

Mild elevation of blood pressure is well documented among pill users. Increased blood pressure attributable to OCPs was identified in 41.5 cases/10 000 in the Nurses Study; the blood pressure normalized in these adults when taken off the OCP.²⁰ Because there are a few anecdotal reports of severe hypertension secondary to OCPs, careful blood pressure monitoring of all adolescents on oral contraceptives is recommended.²¹

Breakthrough Bleeding (BTB)

Although there has been much concern in the past that OCPs will interfere with adolescent menstruation, evidence over the past several decades has indicated that the pill does not oversuppress the hypothalamic-pituitary-ovarian axis and will not lead to suppression of menses. Thus, the young female does not need to wait until she has had several months of regular menses to start OCPs. Also, OCPs do not cause post-pill amenorrhea but rather may mask underlying ovarian dysfunction by mimicking an ovulatory cycle.^{4,7,8} However, transient delay in return of fertility may occur after the pill is stopped. It is important to remember that the sexually active teenager with physiologically irregular periods is still at risk for pregnancy.

When a sexually active teenager develops BTB, a careful evaluation should be done to determine its cause. Be sure the teen is taking the pill every day. BTB is common during the first few months of pill use and usually resolves without treatment. Consider that pill absorption may be compromised by acute gastrointestinal illness and pill effectiveness reduced by other medications (see below). If BTB is severe and/or unrelenting, changing OCPs to a pill which contains norgestrel (eg, Lo/Ovral), norgestimate (eg, Ortho-Cyclen), or levonorgestrel (eg, Norettte, Triphasil) may be helpful. Some clinicians recommend taking 2 pills a day until the bleeding stops or adding 20 μ g of ethinyl estradiol for 7 to 10 days. It is unusual that a pill with 50 μ g of ethinyl estradiol is needed to control bleeding. If amenorrhea develops, rule out pregnancy and consider using a pill with norethindrone (0.4 or 0.5 mg) or norgestimate.

Diabetes Mellitus

Diabetes without vascular disease and gestational diabetes has been placed in the WHO Category 2, in which no restrictions are usually placed on the use of OCPs.¹⁴ Glucose tolerance is not significantly affected when using low-dose pills (35 μ g or less) with 0.4 mg or 0.5 mg norethindrone, the triphasics, and OCPs with norgestimate or desogestrel.^{22,23} It should be remembered, however, that diabetic women are at increased risk for cardiovascular disease, especially if they smoke. Women with diabetes complicated by neuropathy, retinopathy, nephropathy, or other vascular disease are placed in WHO Category 4.¹⁴ If a diaphragm is recommended, it should be noted that the adolescent who has diabetes mellitus may be at an increased risk for urinary tract infections while using the diaphragm.

Seizure Disorders

In general, OCPs do not worsen seizure activity in an adolescent who has epilepsy. If there is an increase in seizures after starting OCPs, an adjustment in the antiepileptic medication dosage is usually sufficient to restore seizure control. However, many anticonvulsant medications can induce an increase in hepatic microsomal enzymes, which can produce increased pill metabolism.²⁴ The result has been a decrease in the pill's contraceptive efficacy resulting in an estimated 3.1 pregnancies per 100 women years of use.²³ These medications include phenytoin, phenobarbital, primidone, ethosuximide, carbamazepine, topiramate, and tiagabine. A number of anticonvulsants do not cause such interference, including valproic acid, gabapentin, felbamate, and lamotrigine. Breakthrough bleeding may also be helped with a more potent progestin or higher dose of estrogen.²³ Reducing the number of placebo pills has also been tried.

Drug Interactions

It is important to know what medications a female is taking before prescribing OCPs. Antacids (magnesium and aluminum types) block absorption of OCPs, especially of progestins. Therefore, it is recommended that antacids should be separated from ingestion of OCPs by at least 3 hours. The possible interaction of OCPs with antibiotics remains somewhat controversial. Rifampin and griseofulvin have been identified by some as examples of chemicals that decrease contraceptive efficacy; also, there has been weak anecdotal evidence that ampicillin, amoxicillin, tetracycline, and metronidazole may decrease efficacy.^{14,25-27} There is no evidence that efficacy is decreased with erythromycin. WHO recommendations, however, are that use of antibiotics is a Category 1 condition, for which there should be no restrictions on OCP use.¹⁴ Serum levels of some medications may be effected by OCPs; these include benzodiazepines, theophylline, prednisolone, caffeine, cyclosporine, and tricyclic antidepressants.²⁷ Use of OCPs in patients on these medications may require careful monitoring of drug levels.

Migraine Headaches

Some females develop new or worsening headaches (including migraines) when placed on the pill. Patients who have headaches with a focal neurologic component (eg, hemiplegic or ophthalmoplegic types) may have an increased risk for a cerebrovascular accident and should not be on OCPs (WHO Category 4).¹⁴ Patients who have headaches without a focal neurologic component or for whom headaches develop or worsen after starting OCPs, can be monitored while on the OCP; however, the pill is usually not restricted (WHO Category 2).¹⁴ As with any patient with headaches, a careful search for other causes (eg, hypertension) should occur. A lower dose OCP (eg, 20- μ g estrogen pill) or even a progestin-only contraceptive may be helpful in reducing the headaches.

Liver Disorders

Females who have active liver disease (WHO Category 4) should not be placed on the OCP; however, OCPs can be prescribed if there is a history of hepatitis and the liver function tests have returned to normal. The only known OCP-associated neoplasm is hepatic cell adenoma with an estimated annual incidence of 3.4 cases per 100 000 pill users.² A variant of this benign tumor is focal nodular hyperplasia; on rare occasions this can rupture in the liver or peritoneum, causing a syndrome of right upper quadrant mass, abdominal pain, right shoulder pain, and diverse symptomatology associated with acute blood loss.

Cancer

There is no current evidence linking the birth control pill with cancer of the endometrium, ovary, or pituitary gland. Indeed, multiple studies support a causal relationship between OCP use and a decrease in risk of ovarian and endometrial cancers.^{8,21,28} The Cancer and Steroid Hormone study has shown that women who used OCPs for as little as 3 to 6 months experienced a 40% reduction in the risk of ovarian cancer and long-term OCP users (> 10 years) experienced an 80% reduction.²⁸ Some researchers have suggested that OCP use be considered as prophylactic treatment for cancer prevention in women with *BRCA1* or *BRCA2* gene mutations. Multiple studies have shown that use of OCPs reduces the risk of endometrial cancer by 50%. The protective effect of OCPs in preventing both ovarian and endometrial cancer persists for >20 years after last use.

There is no evidence that OCPs increase mortality from breast cancer, even with prolonged use.²⁹ There is also no evidence that a positive family history of breast cancer should be a contraindication to OCP use. Current OCP users <35 years old have a slightly increased risk of being diagnosed with breast cancer, perhaps because they receive more frequent and careful medical evaluations.^{23,29,30} Some research does implicate the pill as 1 of several possible contributing factors to cervical cancer.³¹ Cancer of the cervix has many precipitants, including association with early sexarche (onset of coital activity), multiple sex partners, human papillomavirus infection, and others.³² Because women who use OCPs may have an increased number of sexual partners, the role of OCPs in the pathogenesis of cervical cancer remains to be clarified. Certainly, one should conclude that females on OCPs need regular Papanicolaou screening and should use condoms to reduce the risk for sexually transmitted infections.^{1,4,23} Also, there is limited evidence that oral contraceptive use can worsen malignant melanoma.⁹

Miscellaneous

There are numerous side effects of the OCPs that the clinician may encounter. Many effects, such as nausea, weight gain, or *Candida albicans* vulvovaginitis usually do not require stopping the pill. Nausea is usually a self-limited process that ends over 2 or 3 cycles; taking the pill with meals and/or using a 20-

μg estrogen pill may also help. A progestin-only pill may be necessary if the teen cannot tolerate the estrogen component of the pill.

Weight gain is a common concern of adolescents when placed on the pill and is usually not a problem, especially if she watches her salt, fat, and caloric intake. There have been few controlled studies to determine if weight gain is truly associated with OCP use or is a result of other factors, such as decreased exercise. Lowering the estrogen and/or progestin component of the OCP may be helpful in women who have experienced weight gain while using OCPs; however, attention to activity level and food intake is more important. Reduction in estrogen content may also improve estrogen-induced breast congestion.

Acne vulgaris lesions may decrease with OCP use because of the OCP-induced reduction in LH levels (decreasing androgen production), reduction in conversion of testosterone to dihydrotestosterone (resulting from decreased 5 α -reductase activity) and increase in Sex Hormone Binding Globulin levels (with reduced free testosterone).³³ Randomized control studies have demonstrated improvement in acne in patients who were prescribed norgestimate/ethinyl estradiol formulations. Additional studies are needed to determine if other formulations are equally effective in controlling acne.

Acute monilial vaginitis is usually easily controlled with antifungal agents. Chronic infection is not common and may require a longer duration of treatment, evaluation for comorbid factors (eg, broad-spectrum antibiotics or endocrinopathies), reemphasis on the male partner (s) using a condom with each coital act, and/or use of oral antifungal agents to reduce a possible *C albicans* gastrointestinal reservoir.

If a depressed individual is placed on the pill, she should be carefully monitored to see if her depression worsens. If depression develops or worsens while on the pill, the OCP probably should be stopped. If the adolescent becomes pregnant while on the OCPs, the pill should be stopped immediately. There are many other conditions which can arise and consultation with available experts and literature reviews is advised.^{4,8,9,14,23}

Finally, although the possible complications of the birth control pill must be carefully monitored, it should be remembered that there are many therapeutic effects of the pill as well (Table 3).^{28,34–37} Although 50 μg ethinyl estradiol OCPs lowered the incidence of ovarian cysts, lower (20, 30, and 35 μg) estrogen pills may not.³⁸ Causes of OCP failure include poor compliance, drug interactions, and illness (especially gastrointestinal).^{37,39,40} If the teen misses 1 pill, she should take it as soon as remembered, and take the current pill at the regular time. If 2 pills have been missed, have her take 2 pills for each of the following 2 days; also use a back-up method for at least the next 7 days or the remainder of her cycle. If she has missed 3 or more pills, consider emergency contraception and reevaluate her contraceptive issues.

TABLE 3. Noncontraceptive Benefits and Uses of Oral Contraceptives

1. Decreased dysmenorrhea
2. Decreased premenstrual syndrome
3. Polycystic ovary syndrome improvement
4. Decreased mittelschmerz
5. Regulation of menses* (decreases menstrual blood loss by 50%); management of secondary dysfunctional uterine bleeding and anemia from menstrual blood loss secondary to dysfunctional uterine bleeding and blood dyscrasias
6. Lower incidence of ovarian cyst disease* and benign breast disease with 50 μg ethinyl estradiol pill
7. Decreased risk for symptomatic pelvic inflammatory disease (especially *N gonorrhoeae*)
8. Lower incidence of ectopic pregnancy (decreases risk by 90%)
9. Decreased ovarian and endometrial cancer
10. Protective effect for endometriosis*
11. Decreased risk for toxic shock syndrome (decreases risk by 50%)
12. Decreased acne vulgaris
13. Decreased incidence of rheumatoid arthritis

* A 50- μg estrogen pill may be used to treat endometriosis, ovarian cyst disease, dysfunctional uterine bleeding, patient with a possible conflicting drug (as some anticonvulsants, antibiotics), and other conditions.

Mini-pills (Progestin-Only Pills)

The progestin-only pill (POP) includes 0.35 mg norethindrone (Micronor; Nor-Q.D.) and 0.075 mg norgestrel (Ovrette). (Table 2) There is no estrogen component and there is no reliable ovulation inhibition.⁴¹ POPs use secondary contraceptive mechanisms, inducing a thick and less penetrable cervical mucus within 2 to 4 hours, and also endometrial involution that leads to a hostile environment for implantation within 22 hours. There may also be tubal motility changes.

If estrogen is contraindicated or not tolerated, POPs may be an acceptable contraceptive alternative.⁴¹ This method can be used in youth with various chronic conditions, including sickle cell disease, heart disease, diabetes mellitus, hyperlipidemia, systemic lupus erythematosus, and hypertension. The disadvantages of POPs are an increased pregnancy rate (1–3 pregnancies per 100 000 women years) compared with OCPs (<1 pregnancy per 100 000 women years), breakthrough bleeding, and amenorrhea.

POPs should be avoided if the adolescent has a history of an ectopic pregnancy because ectopic pregnancy will not be prevented by POPs since ovulation is not inhibited. The adolescent who has irregular menses or is likely to be noncompliant is also a poor candidate for this method. In addition, POPs should be avoided in patients who are taking rifampin, griseofulvin, and anticonvulsants. A barrier method (eg, condoms with diaphragm or with vaginal contraceptives) can be added to improve the overall contraceptive efficacy of the mini-pill; however, POPs in general should not be recommended for the adolescent who can safely take more efficacious hormonal contraceptives (eg, OCPs, medroxyprogesterone acetate)

Irregular bleeding can be managed by doubling up on POP doses, using nonsteroidal antiinflammatory drugs, and/or adding 20 μg ethinyl estradiol. If an adolescent who is taking the minipill is >3 hours late

in her pill-taking, recommend a back-up method for the next 2 days. If she forgets to take 1 pill, advise her to take it as soon as remembered and use a back-up method immediately for at least the next 2 days. If 2 or more pills are missed and/or there has been no menstrual bleeding for 4 to 6 weeks, test for pregnancy.

Emergency Contraceptives

Although the efficacy of emergency contraceptive pills (ECPs) has been known for many years, little information on this contraceptive method has been provided to adolescents and clinicians until recently.⁴²⁻⁴⁶ In 1997, the FDA approved the use of some OCPs for emergency contraception ("morning-after pill"). More recently, the FDA also has approved an emergency contraceptive kit (Preven), which contains 4 tablets, each with 50 μ g of ethinyl estradiol and 0.25 mg of levonorgestrel.⁴⁷ This kit costs approximately \$30 and includes a home pregnancy test to rule out preexisting pregnancy. In 1999, the FDA approved the first progestin-only emergency method (Plan B), which contains 2 tablets, each with 0.75 mg of levonorgestrel. The first tablet should be taken immediately and the second tablet should be taken 12 hours later. Because Plan B contains no estrogen, nausea and vomiting is uncommon and there is no need to obtain a pregnancy test before administration.

If OCPs are used as emergency contraception, the Yuzpe regimen is recommended. This method consists of 4 Lo/Ovral (0.3 mg norgestrel and 30 μ g ethinyl estradiol) tablets taken immediately and repeated in 12 hours.⁴² It is difficult to assess the efficacy of ECPs because the risk of pregnancy from a single episode of intercourse varies with the menstrual cycle. However, the pregnancy rates after ECP treatment are typically between 0.5% to 2.5%. Recent studies have confirmed, at least with Plan B, that the failure rate increases if administration is delayed more than 24 hours.

ECPs inhibit or delay ovulation and may possibly prevent blastocyst implantation (attributable to endometrial changes), fertilization, or transport of the ovum or sperm.^{42,46} If the Yuzpe method or Preven kit is used, there is a high incidence of nausea (50%) and emesis (20%) secondary to the estrogen component. Some clinicians prescribe an anti-emetic (given rectally or orally) with the first dose. A repeat ECP dose is given if emesis occurs within 2 hours of taking the tablets. With all the ECP methods, the menstrual cycle may be altered and the next menstrual period may start a few days earlier or later than expected. This can be especially concerning for the adolescent who has been sexually assaulted. Medical care should be sought if a menses does not occur within 3 weeks of ECP administration. There is no evidence of adverse effects of the emergency contraceptive regimen on the developing fetus.

To be effective, ECPs must be available 24 hours a day, 7 days a week. To increase the availability of ECPs, some clinicians have recommended that females be given a replaceable supply of ECPs to keep at home. Sexually active females who use contracep-

tion inconsistently or are at high risk for sexual assault would especially benefit from this approach. A discussion of ECPs should be part of contraceptive counseling for all adolescents to increase their awareness of this method. The state of Washington has approved the distribution of Plan B by pharmacists without a physician's prescription.

A current controversial method of postcoital contraception involves mifepristone (RU-486), a progesterone blocker which interrupts hormonal support of the endometrium and functions as an abortifacient.⁴⁸ A single 600-mg dose given within 72 hours of coitus results in a nearly 0% failure rate. It also results in less nausea and emesis than noted with the Yuzpe regimen. Controversy over its mechanism of action has complicated its use in the United States.

Vaginal Barrier Contraceptives

Barrier contraceptives include the diaphragm, vaginal contraceptive sponge, cervical cap, and female condom.^{49,50} Many adolescents, especially young adolescents, are not prepared to deal so intimately with their own bodies and do not wish to prepare so carefully for each coital encounter. Adolescents who have frequent coitus, have a history of previous contraceptive failure, are ambivalent about pregnancy, and/or inconsistently use vaginal barrier contraceptives are at high risk for pregnancy. However, they can be an effective method for highly motivated, educated adolescents.

Diaphragm

Four types of diaphragms are available with sizes ranging from 55 to 105 mm. A 60 to 80 mm coil-spring or flat-spring diaphragm serves most adolescents well. A change in size may be necessary if adolescent is virginal and/or has vaginismus at first fit, has a 10 pound or more weight change, or recently had an abortion (especially mid-trimester). The patient should also be refitted on an annual basis. Contraceptive failure rates with the diaphragm vary widely, from 12% to >38%.⁴⁹ An increased risk for pregnancy is associated with frequent coitus, numerous sex partners, improper fit, age of the user, use of oil-based lubricants, history of poor compliance, previous contraceptive failure, ambivalence about pregnancy, and limited instructions about its proper use. Disposable types with spermicides are undergoing clinical trials.

Vaginal Contraceptive Sponge

The vaginal contraceptive sponge (Today) is another barrier method which seems to be as effective as use of the diaphragm with vaginal contraceptives. It was removed from the market in 1995, but recently has become available again. It is considered safe and effective if knowledgeable health care professionals carefully train motivated adolescents. This disposable, over-the counter, polyurethane, concave-shaped sponge contains the spermicidal agent nonoxynol-9.

The Protectaid Sponge is a newer barrier method that is becoming available. It incorporates 3 spermicides with a polydimethylsiloxane dispersing agent;

the spermicides are sodium cholate, nonoxynol-9, and benzalkonium chloride. The sodium cholate provides strong antiviral activity, while the other 2 provide synergistic spermicidal and antimicrobial effects along with reduced vaginal irritation.

Cervical Cap

The concept of a cervical cap to prevent pregnancy has been known for centuries and introduced in the United States in the 1920s. In 1988, the FDA approved the Prentif cavity-rim cervical cap. This is a small, latex cap that is approximately half of the size of a diaphragm; it fits around the cervix by suction and can stay in place for up to 48 hours.^{23,49,50} It should be used with a spermicide applied inside the cap. The cap is less messy than the diaphragm and more spermicide is not necessary for additional coitus. Compliance issues and failure rates are similar to the diaphragm; increased pregnancy is noted in parous versus nulliparous females. Approximately 25% of women cannot be fitted properly because only 4 cap sizes are available. Newer products (eg, Lea's Shield) are designed to fit all women, and come in 1 size. Because some cap users have developed abnormal Papanicolaou smears within 3 months of beginning this contraceptive method, a Papanicolaou smear is recommended before, and after 3 months of using the cervical cap. As with the diaphragm and sponge, observation for urinary tract infections is recommended and a link to toxic shock syndrome is noted if used during menses and/or left in place too long.

Female Condom

The female condom (eg, Reality) is a polyurethane bag or sheath which fits into the vagina before coitus.⁵¹ It is prelubricated on its inside with a silicone-based lubricant, and has 2 rings—1 placed inside and 1 placed outside the vagina. It is an over-the-counter, disposable barrier contraceptive that comes in only 1 size. Laboratory studies have shown that this method can offer some protection from STDs in the adolescent female whose partner will not use a condom; however, clinical studies are needed to verify if and how much protection is possible.⁵² Failure rates are similar to the diaphragm, sponge, and cap. Other models are being developed, such as one that is an underwear type.

Vaginal Spermicides

These agents include creams, jellies, foams, film, and suppositories. They are used with other barrier methods (condom, diaphragm, cervical cap, sponge, female condom); failure rates are higher if used alone. In vivo efficacy against *Chlamydia trachomatis*, *Neisseria gonorrhoeae*, and *Trichomonas vaginalis* has been reported; in vitro efficacy against these same microbes, as well as against Herpes simplex virus, *Treponema pallidum* and HIV also have been reported.^{23,52,53} Vaginal spermicides used without condoms can reduce the risk for cervical gonorrhea and chlamydia; however, protection against HIV infection if vaginal spermicides are used alone has not been demonstrated.⁵² Vaginal odor, local irritation,

allergic reactions, and a possible increase in urinary tract infections are side effects of this method. A link to birth defects has not been found.

The main spermicide used in these products is nonoxynol-9, a chemical surfactant which destroys the sperm cell wall; another is octoxynol. Other potential spermicides, such as dextran sulfate, a polyanionic polysaccharide, that are a potent spermicide and also inhibit HIV replication in vitro are under study. Other spermicides include chlorhexidine, benzalkonium chloride (found in contraceptive sponges), propranolol, and acrosin inhibitors (eg, nifedipine). Nifedipine prevents sperm recognition of ovum and sperm penetration into the zona pellucida. Research is also being conducted on seminal liquefaction inhibitors, chemicals preventing release of sperm from semen.

Male Condoms

The condom can be an effective contraceptive, especially when combined with vaginal spermicides, and provides some protection from various STD agents.^{23,52,54–56} They can also be used with female barrier contraceptives. Condoms may reduce STD rates more than diaphragms. It is not clear, at this point, whether condoms that are lubricated with spermicides or used with vaginal spermicides are superior to condoms being used alone in prevention of HIV and other STD transmission.⁵² Improved education about condoms and fear of STDs (especially HIV) has led to an increased utilization of condoms by adolescents and young adults over the past decade. Health care professionals can present the subject of condoms in a positive, not negative nor ambivalent, manner encouraging both partners to understand the correct usage of this barrier contraceptive.^{55,56} Methods to encourage condom use by sexually active adolescents remain under study.^{56–60}

The latex condom is recommended because it offers superior protection from STDs over the lamb cecum condom, especially viral STDs (eg, Herpes simplex virus, Hepatitis B virus, HIV). The polyurethane condom (Avanti) became available in 1994 and has a number of advantages over latex condoms.^{61,62} It can be used by the adolescent who has latex allergy, is stronger and thinner than latex condoms, is odorless, prevents STD transmission in vitro, produces increased sensation for the user secondary to heat conduction, can be used with oil-based lubricants, and has less susceptibility to oxidative damage than latex condoms. These condoms are more expensive than the latex condom. Other condoms under research include the Kraton condom, which is less susceptible to oxidative damage than latex types. Current research also seeks new condoms with a tighter base and larger top.

Injectable Contraceptives: Depo-Provera

The main injectable contraceptive available in the United States is depo-medroxyprogesterone acetate (DMPA). It is given in a dose of 150 mg, intramuscularly, every 12 weeks. It has been used as an effective contraceptive agent for over 40 years. It received a limited FDA approval in 1992; approval was de-

layed because of theoretical but unproven links to breast cancer and alleged mutagenic properties.⁶³ Currently, many authorities worldwide consider it to be a safe and effective contraceptive, with a failure rate of 0.3%.^{63,64} Its mechanism of action includes persistent inhibition of ovulation resulting from a decrease in FSH/LH levels and low LH surge as well as induction of an atrophic endometrium and cervical mucus thickening.^{63,64}

DMPA is a useful method whenever a highly effective contraceptive is needed and estrogen side effects must be avoided. For the adolescent who finds it difficult to take a pill everyday, this method may be excellent.⁶⁵ DMPA can be recommended for sexually active adolescents who have cyanotic heart disease, sickle cell anemia, thrombophlebitis, psychosis, and mental retardation. It is often used when other methods have failed or have not been accepted. Benefits of DMPA include decreased risk for endometrial cancer, minimal effects on blood pressure and coagulation, negligible blood glucose changes, nonteratogenic property, and no appreciable interaction with medications (eg, rifampin or anticonvulsants). One study noted that 78% of adolescents remained on DMPA at 6 months for follow-up versus only 46% for those on oral contraceptives.⁶⁶

Side effects of DMPA include irregular menses, amenorrhea, weight gain (sometimes with bloating), and abdominal pain or discomfort.^{67,68} The irregular menstrual bleeding induced by DMPA is usually self-limited; most users eventually become amenorrheic. If necessary, the irregular bleeding can be managed by using 800 mg of ibuprofen 3 times a day for 5 days. A 3-week course of estrogen over 1 to 2 cycles also can be given. Amenorrhea is noted in 30% during the first 3 months of use, in >50% by 12 months, and 70% by 24 months. There also can be a decrease in bone mineral density and high-density lipoprotein levels with DMPA use. Some behavioral changes (eg, irritability, depression, or anxiety) have also been reported. Less common side effects include breast tenderness, fatigue, nausea, dizziness, a decrease in libido, dysmenorrhea, vaginal discharge, peripheral edema, acne, hair loss, and glucose intolerance. Research has not linked DMPA with breast cancer.^{69,70} Some teens do not like this method because it requires an intramuscular injection every 12 weeks. There is a delay in return of fertility but two thirds of sexually active adult females are pregnant at 12 months and 97% by 24 months after discontinuing DMPA.

Research has raised concern that females may develop a decrease in bone density with Depo-Provera versus oral contraceptives and Norplant.⁷¹⁻⁷⁴ DMPA does reduce ovarian estrogen production, which can induce a hypoestrogenic state. In 1 small study of adolescents on DMPA, there was a 1.5% decrease in bone mineral density after 1 year and 3.1% decrease in bone mineral density over 2 years, in contrast to a 2.9% increase at 1 year and a 9.5% increase at 2 years in controls.⁷¹ It is not clear if this always occurs and if it is irreversible once this contraceptive is discontinued. Because up to 60% of bone mass is acquired during adolescence, any factor that reduces bone

mass is of concern. Additional study is needed to resolve the issue of bone loss in adolescents on DMPA. Some experts recommend not using DMPA for those <15 years old or within 3 years of menarche.⁷⁴ Until more research clarifies this issue, DMPA should be avoided in teens at risk for osteoporosis; this includes those who have chronic renal disease, are wheelchair-bound, have eating disorders, and/or have chronic amenorrhea.

There are 2 other injectables that have been used in other countries. They provide better cycle control than DMPA, and bleeding patterns are closer to normal. Cyclofem (25 mg of DMPA with 10 mg of estradiol cypionate), is an injectable contraceptive given once a month; <5% of adult women using this method developed secondary amenorrhea. Another injectable product that is given monthly is Mesigyna (with 50 mg of norethindrone and 5 mg of estradiol valerate). Also, Lunelle (estradiol cypionate and medroxyprogesterone acetate) is another once-a-month injectable contraceptive now with FDA approval. Eventually a once-a-month injectable will be developed for self-administration. There is no research data on the use of these products in adolescents. For the adolescent who often is fearful of injections, a monthly injection is not appealing; however, contraceptives that require less frequent injections would be more desirable for this age group. Longer-acting injectable contraceptives, lasting 6 to 8 months, are under study.

Implant Contraceptive: Norplant

In 1990, Norplant was released as a contraceptive method in which 6 elongated, silastic capsules are inserted subcutaneously into the upper arm.³⁷ Another implant that will be released soon in the United States is the Norplant II; this is a 2-rod implant system which has release rates, pregnancy rates, and side effects similar to the 6-rod system. Norplant allows slow release of levonorgestrel (85 $\mu\text{g}/\text{d}$ for 8 months and 30 $\mu\text{g}/\text{d}$ thereafter) and provides effective contraception for 5 years. The mechanism of action is similar to DMPA, and the failure rate is only 0.2%. The frequency of ovulatory cycles is approximately 39% over 5 years (11% in the first year, 28% at the third year, and 52% at year 5).^{37,75} There is increased cervical mucus viscosity, impaired oocyte maturation, and atrophic endometrial effects.⁷⁵

Most pregnancies in the first year of use are attributable to unrecognized pregnancy at the time of insertion. In a study of adolescent mothers, 2% of the Norplant users became pregnant in the first year of use, compared with 38% of oral contraceptive users.⁷⁶ In this same study, 95% of 48 adolescents who used no method had a pregnancy within 1 year, when compared with 33% of 50 adolescents on oral contraceptives.⁷⁶ The continuation rates vary; 1 study reported a continuation rate of 96% after 1 year, in contrast to 83% for DMPA and 49% for oral contraceptives.⁷⁷ In another study, 14% of teens requested removal of their Norplant within 6 months of insertion.⁶⁶

Side effects of Norplant include irregular menses (>40% in the first year), amenorrhea, mild head-

aches, and weight gain; anemia does not usually occur, despite the irregular bleeding.^{78,79} If necessary, the irregular bleeding can be managed with the use of nonsteroidal antiinflammatory medications and/or combined oral contraceptives.⁸⁰ The average weight gain is 3.3 kg/y, but can be much more. In 1 study, approximately 16% noted worsening headaches and 15% acne.⁶⁶ Other side effects include hair loss (< 10%), depression, pain/pruritus at the insertion site, decreased libido (<5%), and arm/chest/abdominal pain (<5%).^{75,79} Norplant has minimal impact on carbohydrate and lipid metabolism.

Reasons for removal include menstrual irregularities, breast congestion/pain, unacceptable weight gain, hair loss, acne, worsening headaches, depression, and a desire for pregnancy. Other problems with this method are the need for a clinician visit for surgical insertion/removal requiring local anesthesia/incision, the expense of the procedure (\$500+), and the visibility of capsules. There is no STD protection (including HIV) with this method and the long-term safety has not been established (including the effects on future fertility), especially in adolescents. This method has received somewhat limited acceptance by adolescents, probably because of the fear of the subcutaneous insertion, menstrual irregularity, and weight gain. The effectiveness of Norplant can be reduced in patients taking medications which induce hepatic enzymes; these chemicals include rifampin, carbamazepine, and phenytoin.³⁷

Norplant is a fully reversible, very effective, non-estrogen contraceptive that has high continuation rates in carefully selected adolescents. Candidates for Norplant include adolescents who cannot take estrogen, have been unable to use other methods, and/or desire long-term contraceptive efficacy. A trial of Ovrette (oral norgestrel) can be prescribed for 1 to 2 months if there is a question of tolerance to levonorgestrel.

IUD

There are 2 IUDs which currently are used in the United States namely Progestasert IUD (Alza Corp, Palo Alto, CA) and the ParaGard (Ortho-McNeil, Raritan, NJ) (Copper T380A).^{81,82} The Progestasert IUD was introduced in 1976, is replaced every year, has an expulsion rate of 2.7%, and can induce decreased menses as well as dysmenorrhea. The ParaGard was introduced in 1983, is replaced every 8 to 10 years, has a lower failure rate than the Progestasert IUD, and has an expulsion rate of 5%. Insertion can be at any time, but the ideal time of insertion is at the time of ovulation.

The mechanisms of action for IUDs include blocking blastocyst implantation based on such theories as the induction of a low grade endometritis, the copper's effects on enzymes, progesterone's actions on the endometrium, and inhibition of sperm/ovum migration. Failure rates are 1.3% to 1.6% for the Progestasert IUD, and 0.5% to 0.8% at 1 year for the Copper T380A. The pregnancy rates vary from 0.2% to 3% annually with 50% of intrauterine pregnancies leading to spontaneous abortions and 3 to 5% leading to ectopic pregnancies.

Candidates for IUD placement include women who have medical conditions that prevent the use of estrogens, have a monogamous lifestyle for the duration of the IUD use, and desire a long-acting, reversible method.⁸²⁻⁸⁵ Breastfeeding is not a contraindication for IUD use.

The possible risk of pelvic inflammatory disease for the adolescent who uses an IUD should always be considered. The IUD is normally not appropriate for adolescents, although it is an effective method of contraception for many adults.

Miscellaneous

Periodic abstinence (Rhythm Methods; Natural Family Planning; Fertility Awareness) can be effective for highly motivated youth who are carefully attuned to cervical mucus changes and timing of ovulation.⁸⁶ The period of fertility can be calculated using the calendar method, basal body temperature, and/or cervical-mucus stickiness (Billing's method). Its applicability to most teenagers is quite limited, as failure rate are high (6%-38%). In the Ogino-Knaus Method (Calendar/Rhythm Method), coitus is avoided during the time of estimated ovulation (menstrual days 12 to 16) and estimated ovum survival (24 hours) as well as sperm survival (3 to 4 days). The Temperature Method is based on the concept that, on awakening, there is a decrease of the basal body temperature before ovulation followed by an increase for several days.

The Billings Ovulation Method revolves around changes in the cervical mucus over the course of a monthly cycle. A copious, watery discharge with ferning (spinnbarkeit), as demonstrated by microscopic evaluation of an air-dried slide, suggests a high estrogen state before ovulation. A thick, tenacious discharge without ferning is reflective of progesterin effect, as noted after ovulation (as well as in pregnancy or resulting from use of a progestin-containing contraceptive).

Lactation can induce amenorrhea but is not a reliable contraceptive, especially if supplemental feedings are given to the baby and/or the baby is 6 months old or older. Coitus interruptus is a method of antiquity which is difficult, if not impossible, for most teenage males to use as an effective contraceptive method. It is dependent on the male's ability and willingness to withdraw before ejaculation. However, it results in a high pregnancy rate and offers no STD protection.

Noncoital sex (as masturbation, kissing, petting, oral sex) can be used by some individuals as an alternative to coitus. Helping adolescents postpone coital behavior, encouraging appropriate sexuality education for the adolescent, and avoiding unwanted pregnancy as well as STDs remain important goals for the clinician.⁸⁷⁻⁹⁰

Sterilization is a method that legally is not available to teenagers except in very rare circumstances. Unfortunately, several hundreds of thousands of American adolescents have been involuntarily and unknowingly sterilized over the past several decades because of pelvic inflammatory disease. Finally, although some use abortion as a contraceptive method,

health care professionals should instruct youth that abortion is not a method of contraception as such.

Summary

Prevention of unwanted adolescent pregnancy is a critical goal of the clinician caring for adolescents.^{89,90} The most effective contraceptive method is abstinence. Combined oral contraceptives, intramuscular medroxyprogesterone acetate (Depo-Provera), and levonorgestrel subdermal implants (Norplant) all have pregnancy rates under 1/100 woman years of use. The barrier methods (condom, diaphragm, or cervical cap with spermicide) and periodic abstinence have higher pregnancy rates, but are potentially very effective contraceptive methods. Concomitant use of the male condom should be strongly encouraged for all sexually active adolescents to prevent STDs.

Concern over the side-effects of various contraceptive methods must be carefully discussed. However, it should be remembered that the risks of contraceptives are nearly always far lower than those for pregnancy and childbirth. A careful matching of the adolescent with an appropriate contraceptive method will help minimize associated morbidity and non-compliance. Frequent follow-up is important to improve compliance and more effectively monitor for possible complications of the method which has been chosen by the adolescent with her clinician's guidance. A discussion of pregnancy prevention methods, including abstinence, should be part of the health supervision visit for all adolescents.

ACKNOWLEDGMENTS

The authors gratefully acknowledge the help of the following reviewers for their insight and constructive review: Robert Carter, MD, Martin B. Draznin, MD, Arthur N. Feinberg, MD, J. Donald Hare, MD, Debra M. O'Donnell, MD, David S. Rosen, MD, MPH, and Robin Rosenstock, MD.

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“Selling my eggs would be wrong” . . . And the more I thought it, the more I thought that my eggs were not alone. The rules and rhetoric of commerce seem to fail all things reproductive. The events and choices made along the reproductive continuum resist marketplace classification. Their meaning spills over, leaving a residue that is not easily wiped away. Marketplace terms (“informed parties,” “uncoerced choices,” “thorough contracts,” “services,” “products”) ring anemic here. They do not seem to capture everything that goes into whether people desire a child or not.

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Submitted by Student

Contraception in the Adolescent: An Update
Donald E. Greydanus, Dilip R. Patel and Mary Ellen Rimsza
Pediatrics 2001;107;562-573
DOI: 10.1542/peds.107.3.562

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