Female Reproductive System

8

INTRODUCTION

Sexual reproduction is the union of the nuclei of the **ovum** (the female sex cell) and the **sperm** cell (the male sex cell) that results in the creation of an embryo. The ovum and the sperm cell are specialized cells that differ from normal body cells: Each sex cell, known as a **gamete,** contains exactly half the number of chromosomes of a normal body cell. When the nuclei of ovum and sperm cell unite, the cell produced receives half of its genetic material from its female parent and half from its male parent; thus, it contains a full, normal complement of hereditary material.

Special organs called **gonads** in males and females produce the egg and sperm cells. The female gonads are the **ovaries,** and the male gonads are the **testes.** After an ovum leaves the ovary, it travels down one of two **fallopian tubes** leading to the **uterus** (womb). If **coitus** (copulation, sexual intercourse) has occurred and sperm cells travel into the fallopian tube, they can penetrate the ovum. This is **fertilization.** The fertilized ovum is then known as a **zygote.** After many cell divisions, a ball of cells forms, and the zygote is called an **embryo** (2 to 8 weeks) and finally a **fetus** (8 to 38 or 40 weeks). The period of development within the uterus is **gestation,** or **pregnancy.**

The female reproductive system consists of organs that produce **ova** and provide a place for the growth of the embryo. In addition, the female reproductive organs supply important hormones that contribute to the development of female secondary sex characteristics (body hair, breast development, structural changes in bones and fat).

The eggs, or ova, are present from birth in the female ovary but begin to mature and are released from the ovary in a 21- to 28-day cycle when secondary sex characteristics develop. The occurrence of the first cycle is called **menarche.** Menstrual cycles continue until **menopause,** when all eggs have been released, hormone production diminishes, and menstruation ends. If fertilization occurs during the years between menarche and menopause, the fertilized egg may grow and develop within the uterus. A new, blood vessel–rich lining called a **placenta** develops to nourish the embryo, which implants in the uterine lining. Various hormones are secreted from the ovary and from the placenta to stimulate the expansion of the placenta. If fertilization does not occur, hormone changes result in shedding of the uterine lining, and bleeding, or **menstruation,** occurs.

The hormones of the ovaries, **estrogen** and **progesterone,** play important roles in the processes of menstruation and pregnancy, and in the development of secondary sex characteristics. The **pituitary gland,** located at the base of the brain, secretes other hormones that govern the reproductive functions of the ovaries, breasts, and uterus.

Gynecology is the study of the female reproductive system (organs, hormones, and diseases); **obstetrics** (Latin *obstetrix* means midwife) is a specialty concerned with pregnancy and the delivery of the fetus; and **neonatology** is the study of the care and treatment of the newborn.

ORGANS OF THE FEMALE REPRODUCTIVE SYSTEM

UTERUS, OVARIES, AND ASSOCIATED ORGANS

Label Figures 8-1 and 8-3 as you read the following description of the female reproductive system.

Figure 8-1 shows a side view of the female reproductive organs and their relationship to the other organs in the pelvic cavity. The **ovaries** [1] (only one ovary is shown in this lateral view) are a pair of small almond-shaped organs located in the pelvis. The **fallopian tubes** [2] (only one is shown in this view) lead from each ovary to the **uterus** [3], which is a fibromuscular organ situated between the urinary bladder and the rectum. The uterus (womb) normally is the size and shape of a pear and is about 3 inches long in a nonpregnant

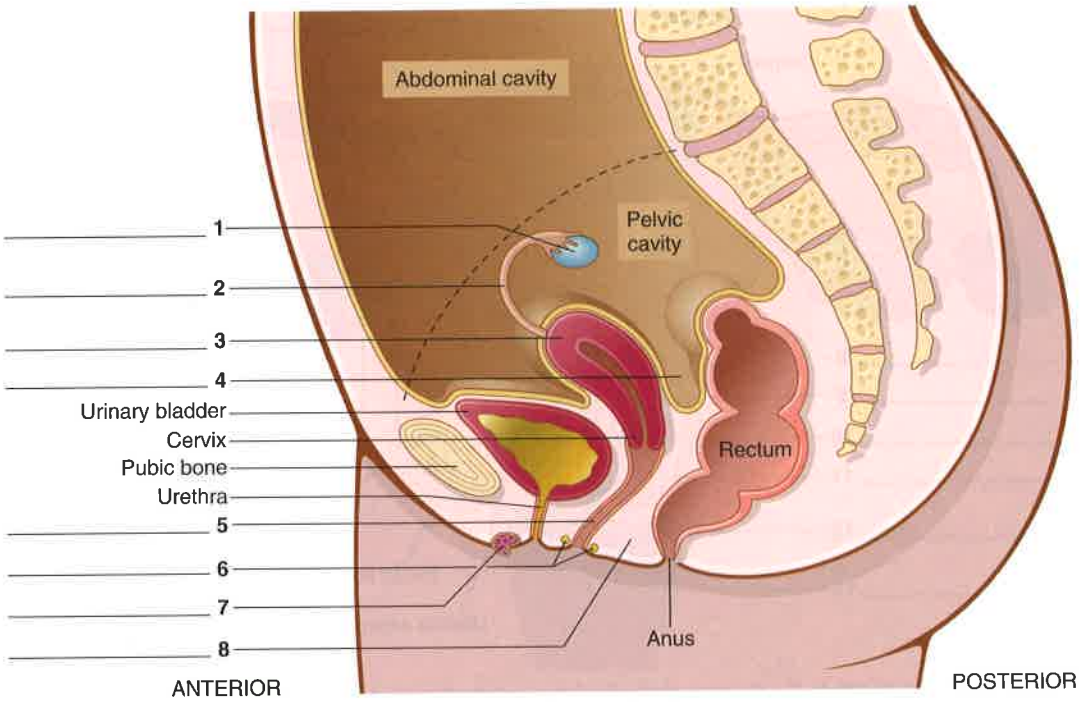

FIGURE 8–1 **Organs of the female reproductive system,** lateral view.

woman. Midway between the uterus and the rectum is a region in the abdominal cavity known as the **cul-de-sac** [4].

The **vagina** [5], a tubular structure, extends from the uterus to the exterior of the body. **Bartholin glands** [6] are two small, rounded glands on either side of the vaginal orifice. These glands produce a mucous secretion that lubricates the vagina. The **clitoris** [7] is an organ of sensitive, erectile tissue located anterior to the vaginal orifice and in front of the urethral meatus. The region between the vaginal orifice and the anus is the **perineum** [8].

The external genitalia of the female are collectively called the **vulva.** Figure 8-2 shows the various structures that are part of the vulva. The **labia majora,** the outer lips of the vagina, surround the smaller, inner lips, the **labia minora.** The **hymen,** a thin membrane partially covering the entrance to the vagina, is broken apart during the first episode of intercourse. The clitoris and Bartholin glands also are parts of the vulva.

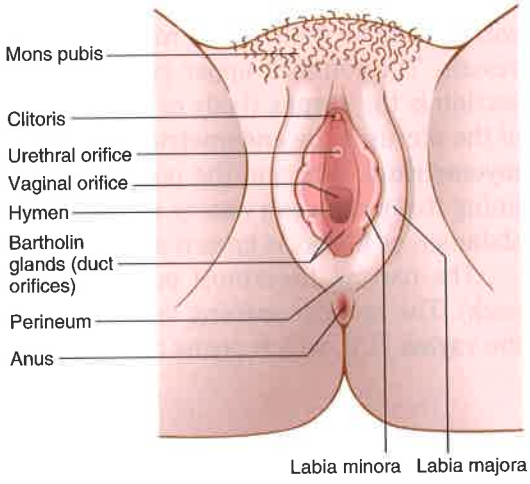

FIGURE 8–2 **Female external genitalia (vulva).** The mons pubis (Latin *mons,* mountain) is a pad of tissue overlying the pubic symphysis. After puberty it is covered with pubic hair.

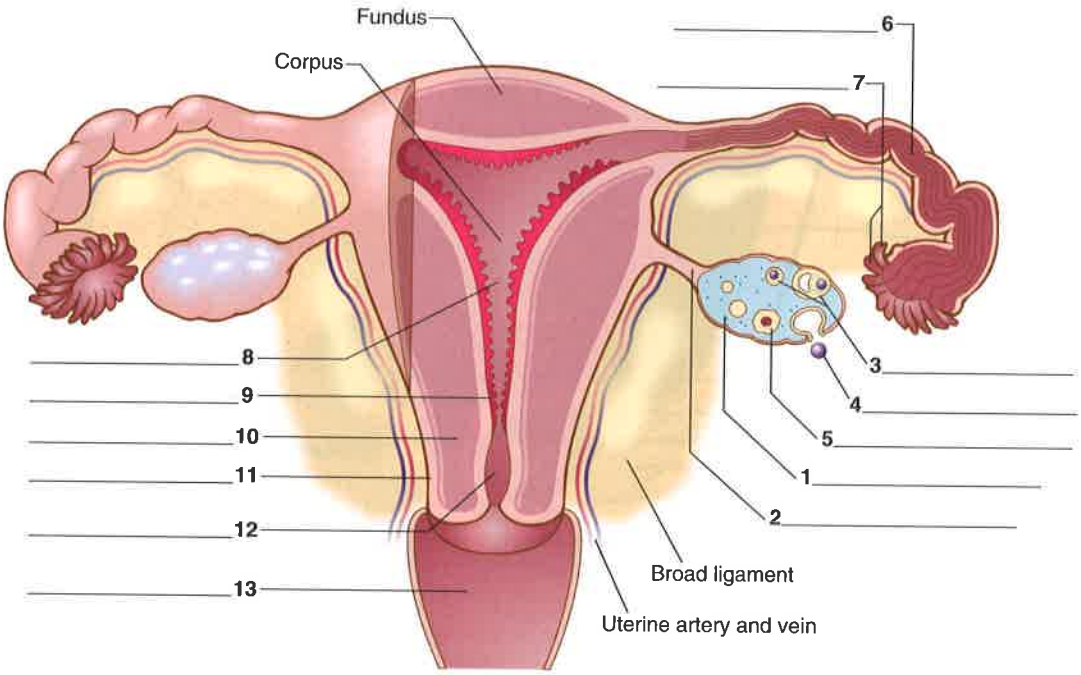

FIGURE 8–3 **Organs of the female reproductive system,** anterior view.

Figure 8-3 shows an anterior view of the female reproductive system. Each **ovary** [1] is held in place on either side of the uterus by a **utero-ovarian ligament** [2].

Within each ovary are thousands of small sacs—the **ovarian follicles** [3]. Each follicle contains an **ovum** [4]. During **ovulation**, an ovum matures; its follicle ruptures through the surface and releases the ovum from the ovary. A ruptured follicle fills with a yellow, fat-like material. It is then called the **corpus luteum** [5], meaning yellow body. The corpus luteum secretes a hormone that maintains the very first stages of pregnancy.

A **fallopian tube** [6] is about 5½ inches long and lies near each ovary. Collectively, the fallopian tubes, ovaries, and supporting ligaments are the **adnexa** (accessory structures) of the uterus. The finger-like ends of the fallopian tube are the **fimbriae** [7]. They catch the egg after its release from the ovary. **Cilia** (small hairs) line the fallopian tube and, through their motion, sweep the ovum along. It usually takes the ovum about 2 to 3 days to pass through the fallopian tube.

If sperm cells are present in the fallopian tube, fertilization may occur. If sperm cells are not present, the ovum remains unfertilized and eventually disintegrates.

The fallopian tubes, one on each side, lead into the **uterus** [8], a pear-shaped organ with muscular walls and a mucous membrane lining filled with a rich supply of blood vessels. The rounded upper portion of the uterus is the **fundus,** and the larger, central section is the **corpus** (body of the organ). The inner layer, a specialized epithelial mucosa of the uterus is the **endometrium** [9]; the middle, muscular layer of the uterine wall is the **myometrium** [10]; and the outer, membranous tissue layer is the **uterine serosa** [11], a lining that produces a watery, serum-like secretion. The outermost layer of an organ in the abdomen or thorax is known as a serosa.

The narrow, lowermost portion of the uterus is the **cervix** [12] (Latin *cervix* means neck). The cervical opening leads into a 3-inch-long muscular, mucosa-lined canal called the **vagina** [13], which opens to the outside of the body.

THE BREAST (ACCESSORY ORGAN OF REPRODUCTION)

Label Figure 8-4 as you read the following description of breast structures.

The breasts, located on the upper anterior region of the chest, are composed mostly of **mammary glands.** The **glandular tissue** [1] contains milk glands or lobules that develop in response to hormones from the ovaries during puberty. The breasts also contain **fibrous** and **fatty tissue** [2], special **lactiferous** (milk-carrying) **ducts** [3], and **sinuses** (cavities) [4] that carry milk to the nipple, which has small openings for the ducts to release their milk. The breast nipple is the **mammary papilla** [5], and the dark pigmented area around the mammary papilla is the **areola** [6].

During pregnancy the hormones from the ovaries and the placenta stimulate glandular and other tissues in the breasts to their full development. After **parturition** (giving birth), hormones from the pituitary gland stimulate the normal secretion of milk **(lactation).**

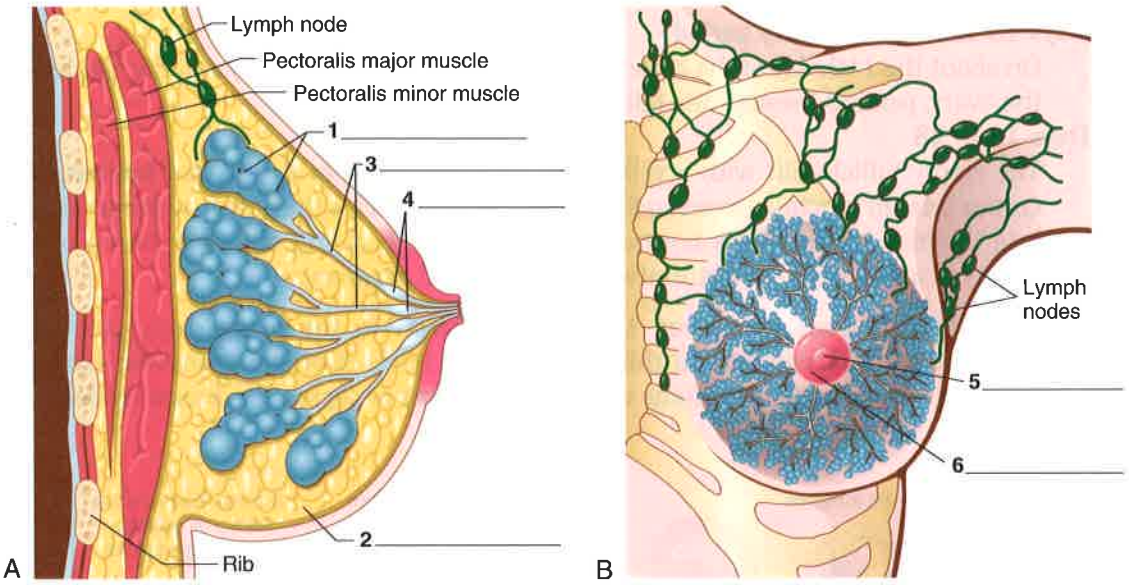

FIGURE 8–4 **Views of the breast. (A)** Sagittal. **(B)** Frontal. Notice the numerous lymph nodes.

MENSTRUATION AND PREGNANCY

MENSTRUAL CYCLE (Figure 8-5)

Menarche, or onset of menstruation with the first menstrual cycle, occurs at the time of puberty. An average menstrual cycle lasts for 28 days but may be shorter or longer, and cycles may be irregular in length. These days can be divided into four time periods, useful in describing the events of the cycle. The approximate time periods are as follows:

Days 1 to 5 (menstrual period)
Discharge of bloody fluid containing disintegrated endometrial cells, glandular secretions, and blood cells.

Days 6 to 12
After bleeding ceases, the endometrium begins to repair itself. The maturing follicle in the ovary releases **estrogen,** which aids in the repair. The ovum grows in the follicle during this period.

Days 13 and 14 (ovulatory period)
On about the 14th day of the cycle, the follicle ruptures **(ovulation)** and the egg leaves the ovary, passing through the fallopian tube.

Days 15 to 28
The empty follicle fills with a yellow material and becomes the **corpus luteum.** The corpus luteum functions as an endocrine organ and secretes the hormone **progesterone** into the bloodstream. This hormone stimulates the building up of the lining of the uterus in anticipation of fertilization of the egg and pregnancy.

If fertilization does *not* occur, the corpus luteum in the ovary stops producing progesterone and regresses. At this time, lowered levels of progesterone and estrogen probably are responsible for some women's symptoms of depression, breast tenderness,

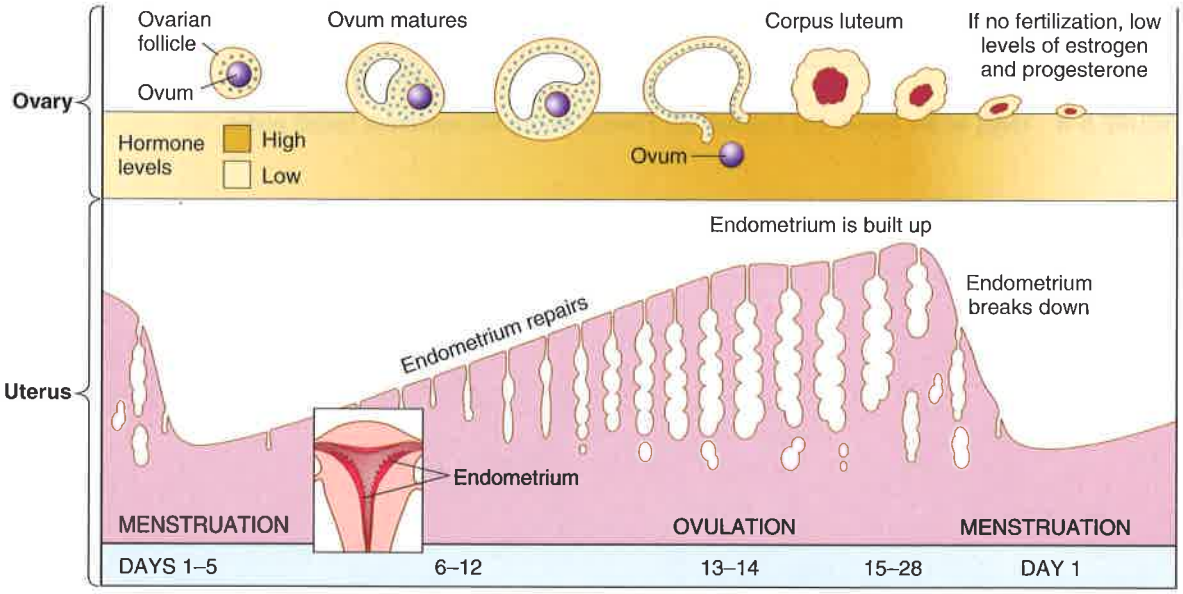

FIGURE 8–5 **The menstrual cycle.** *Tip*: Don't try to memorize this figure. Just get the big picture! In the **ovary,** as the ovum matures, hormone levels rise culminating in ovulation (days 13 and 14). At the same time, in the **uterus** the endometrium is building up in anticipation of pregnancy. If pregnancy does not occur, hormone levels drop and **menstruation** begins.

and irritability before menstruation. The combination of these symptoms is known as **premenstrual syndrome (PMS).** After 2 days of decrease in hormones, the uterine endometrium breaks down, and the menstrual period begins (days 1 to 5).

Note: Cycles vary in length, ranging from 21 to 42 days or longer. Ovulation typically occurs 14 days before the end of the cycle. A woman with a 42-day cycle ovulates on day 28, whereas a woman with a 21-day cycle ovulates on day 7.

PREGNANCY

If fertilization does occur in the fallopian tube, the fertilized egg travels to the uterus and implants in the uterine endometrium. The corpus luteum in the ovary continues to produce progesterone and estrogen. These hormones support the vascular and glandular development of the uterine lining.

The **placenta,** a vascular organ, now forms within the uterine wall. The placenta is derived from maternal endometrium and from the **chorion,** the outermost membrane that surrounds the developing embryo. The **amnion,** the innermost of the embryonic membranes, holds the fetus suspended in an amniotic cavity surrounded by a fluid called the **amniotic fluid.** The amnion with its fluid also is known as the "bag of waters" or amniotic sac, which ruptures (breaks) during labor.

The maternal blood and the fetal blood never mix during pregnancy, but important nutrients, oxygen, and wastes are exchanged as the blood vessels of the fetus (coming from the umbilical cord) lie side by side with the mother's blood vessels in the placenta. Figure 8-6A and B shows implantation in the uterus and the embryo's relationship to the placenta and enveloping membranes (chorion and amnion).

As the placenta develops in the uterus, it produces its own hormone, **human chorionic gonadotropin (hCG).** When women test their urine with a pregnancy test kit, presence or absence of hCG confirms or denies that they are pregnant. This hormone stimulates the corpus luteum to continue producing hormones until about the third month of pregnancy, when the placenta takes over the endocrine function and releases estrogen and progesterone. Progesterone maintains the development of the placenta. Low levels of progesterone can lead to spontaneous abortion in pregnant women and menstrual irregularities in nonpregnant women.

The uterus normally lies within the pelvis. During pregnancy the uterus expands as the fetus grows, and the superior part rises out of the pelvic cavity to become an abdominal

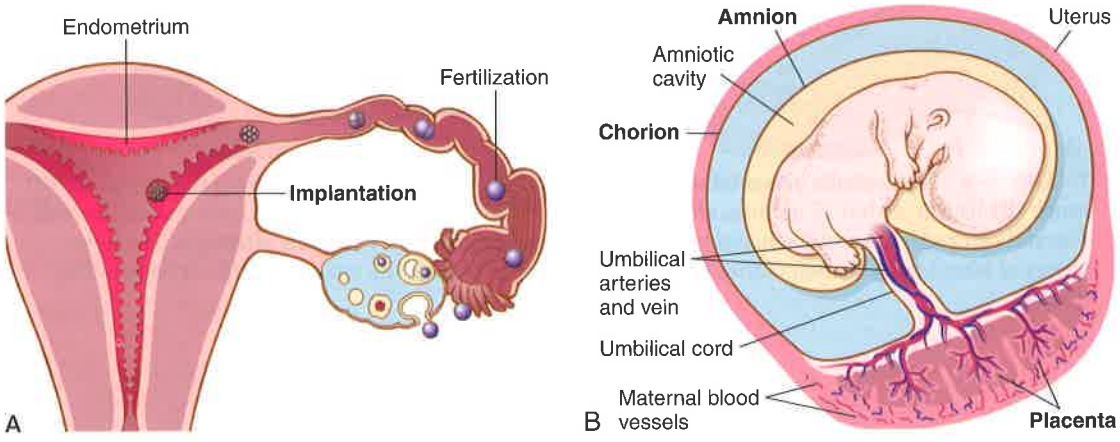

FIGURE 8–6 **(A) Implantation of the embryo** in the endometrium. **(B)** The **placenta, chorion,** and **amnion** membranes.

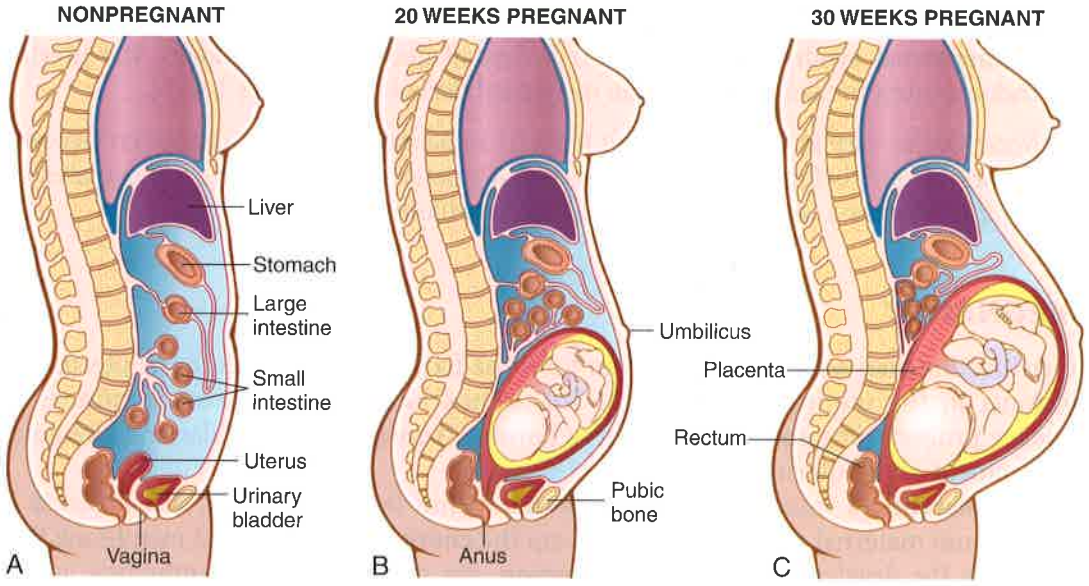

FIGURE 8–7 **The growing uterus changes the pelvic anatomy during pregnancy,** as shown here in sagittal section: **(A)** nonpregnant woman, **(B)** 20 weeks pregnant, **(C)** 30 weeks pregnant.

organ. By about 28 to 30 weeks, it occupies a large part of the abdominopelvic cavity and reaches the epigastric region (Figure 8-7).

The onset of true labor is marked by rhythmic contractions, dilation of the cervix, and a discharge of bloody mucus from the cervix and vagina (the "show"). In a normal delivery position, the baby's head appears first (cephalic presentation). After vaginal delivery of the baby, the placenta follows, and the umbilical cord is cut (Figure 8-8). Figure 8-9A and B are photographs of a newborn and the placenta with attached cord, minutes after birth. The expelled placenta is the **afterbirth.**

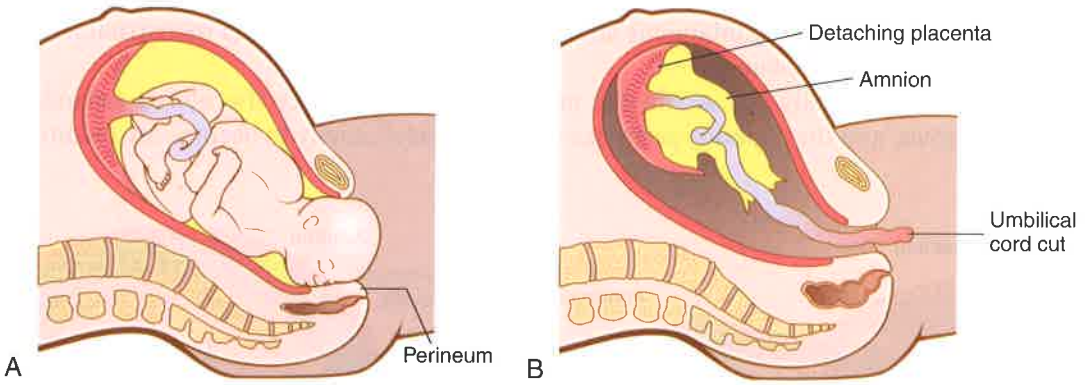

FIGURE 8–8 **(A) Cephalic presentation** ("crowning") of the fetus during delivery from the vaginal (birth) canal. **(B)** Usually within 15 minutes after parturition (birth), the placenta separates from the uterine wall. Forceful contractions expel the placenta and attached membranes, now called the **afterbirth.** The three phases of labor are (I) dilation of the cervix, (II) expulsion or birth of the infant, and (III) delivery of the placenta.

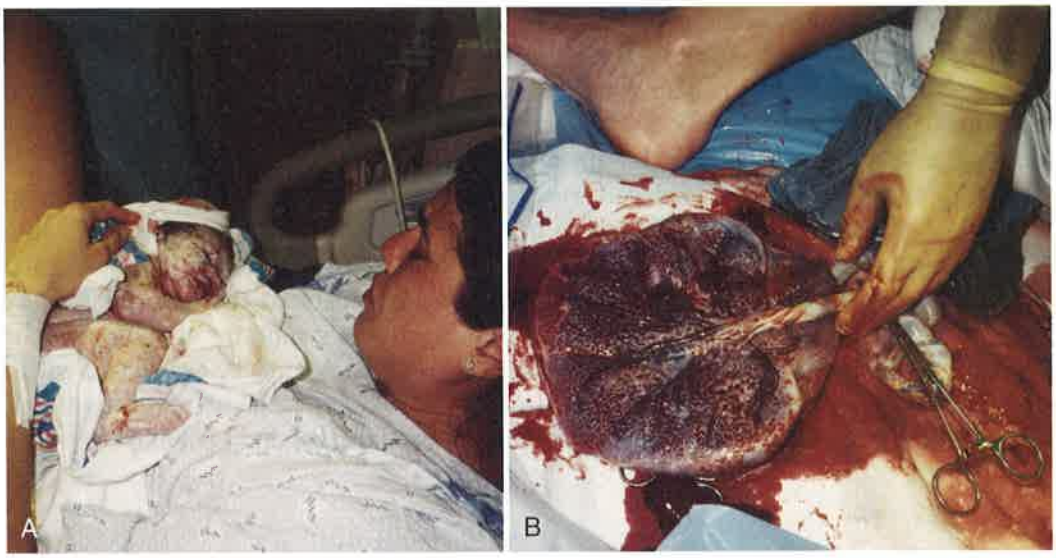

FIGURE 8–9 **(A)** My newborn granddaughter, Beatrix Bess (Bebe) Thompson, and her mother, Dr. Elizabeth Chabner Thompson, minutes after Bebe's birth. Notice that Bebe's skin is covered with vernix caseosa, a mixture of a fatty secretion from fetal sebaceous (oil) glands and dead skin. The vernix protects the fetus's delicate skin from abrasions, chapping, and hardening as a result of being bathed in amniotic fluid. **(B)** The placenta and umbilical cord just after expulsion from the uterus.

HORMONAL INTERACTIONS

The events of menstruation and pregnancy depend on hormones not only from the ovaries (estrogen and progesterone) but also from the **pituitary gland.** The pituitary gland secretes **follicle-stimulating hormone (FSH)** and **luteinizing hormone (LH)** after the onset of menstruation. In the hypothalamus (a region of the brain), "pulses" of a hormone called gonadotropin-releasing hormone (GnRH) lead to an upsurge of FSH and LH. As their levels rise in the bloodstream, FSH and LH stimulate maturation of the ovum and ovulation. After ovulation, LH in particular influences the maintenance of the corpus luteum and its production of estrogen and progesterone.

During pregnancy, the high levels of estrogen and progesterone coming from the ovary and placenta cause the pituitary gland to stop producing FSH and LH. Therefore, while a woman is pregnant, additional eggs do not mature and ovulation cannot occur. This hormonal interaction whereby a high level of hormones (estrogen and progesterone) shuts off production of another set of hormones (FSH and LH) is known as a **negative feedback loop.** Oral contraceptives (birth control pills) work by negative feedback. The pills contain variable amounts of estrogen and progesterone, which causes blood levels of these hormones to rise. Negative feedback occurs, and the pituitary does not release FSH or LH. Low blood concentration of FSH means that ovarian follicles do not mature and ovulation does not occur. Subdermal birth control implants containing progesterone-like drugs (progestins) are effective for up to 5 years.

Another female reversible birth control measure is use of an **IUD (intrauterine device).** A physician inserts the IUD, a small device designed to remain inside the uterus. Some IUDs release hormones locally that prevent implantation and decrease heavy menstrual periods. Ortho Evra (once-a-week birth control patch that releases ethinyl estradiol) and NuvaRing (a hormone-releasing vaginal ring inserted once a month) are other contraceptive devices containing hormones that work like birth control pills. These types of contraception do not protect against sexually transmitted diseases or HIV infection. (The Practical Applications section for this chapter includes a table of contraceptive choices and their features on page 290.)

When all of the ova are used up and secretion of estrogen from the ovaries lessens, **menopause** begins. Menopause signals the gradual ending of the menstrual cycle. Premature menopause occurs before age 45, whereas delayed menopause occurs after age 55. Artificial menopause occurs if the ovaries are removed by surgery or made non-functional as a result of radiation therapy or some forms of chemotherapy.

During menopause, when estrogen levels fall, the most common signs and symptoms are hot flashes (temperature regulation in the brain is disturbed), insomnia, and vaginal atrophy (lining of the vagina dries and thins, predisposing the affected woman to irritation and discomfort during sexual intercourse). **Hormone replacement therapy (HRT),** given orally or as a transdermal patch or vaginal ring, relieves these symptoms of menopause and delays the development of weak bones (osteoporosis). HRT use may be associated with an increased risk of breast cancer, endometrial cancer, stroke, or heart attack. This therapy should be used only after careful consideration of potential risks and benefits.

VOCABULARY

The following list reviews many of the new terms introduced in the text. Short definitions reinforce your understanding of the terms.

adnexa uteri	Fallopian tubes, ovaries, and supporting ligaments.
amnion	Innermost membranous sac surrounding the developing fetus.
areola	Dark-pigmented area surrounding the breast nipple.
Bartholin glands	Small mucus-secreting exocrine glands at the vaginal orifice (opening to outside of the body).
cervix	Lower, neck-like portion of the uterus.
chorion	Outermost layer of the two membranes surrounding the embryo; it forms the fetal part of the placenta.
clitoris	Organ of sensitive erectile tissue anterior to the opening of the female urethra.
coitus	Sexual intercourse; copulation. Pronunciation is KŌ-ĭ-tus.
corpus luteum	Empty ovarian follicle that secretes progesterone after release of the egg cell; literally means yellow (luteum) body (corpus).
cul-de-sac	Region in the lower abdomen, midway between the rectum and the uterus.
embryo	Stage in prenatal development from 2 to 8 weeks.
endometrium	Inner, mucous membrane lining of the uterus.
estrogen	Hormone produced by the ovaries; promotes female secondary sex characteristics.
fallopian tube	One of a pair of ducts through which the ovum travels to the uterus.
fertilization	Union of the sperm cell and ovum from which the embryo develops.
fetus	Stage in prenatal development from 8 to 39 or 40 weeks.

fimbriae (*singular:* fimbria)	Finger- or fringe-like projections at the end of the fallopian tubes.
follicle-stimulating hormone (FSH)	Secreted by the pituitary gland to stimulate maturation of the egg cell (ovum).
gamete	Male or female sexual reproductive cell; sperm cell or ovum.
genitalia	Reproductive organs; also called genitals.
gestation	Period from fertilization of the ovum to birth.
gonad	Female or male reproductive organ that produces sex cells and hormones; ovary or testis.
gynecology	Study of the female reproductive organs including the breasts.
human chorionic gonadotropin (hCG)	Hormone produced by the placenta to sustain pregnancy by stimulating (-tropin) the ovaries to produce estrogen and progesterone.
hymen	Mucous membrane partially or completely covering the opening to the vagina.
labia	Lips of the vagina; labia majora are the larger, outermost lips, and labia minora are the smaller, innermost lips.
lactiferous ducts	Tubes that carry milk within the breast.
luteinizing hormone (LH)	Hormone produced by the pituitary gland; promotes ovulation.
mammary papilla	Nipple of the breast. A papilla is any small nipple-shaped projection.
menarche	Beginning of the first menstrual period and ability to reproduce.
menopause	Gradual ending of menstruation.
menstruation	Monthly shedding of the uterine lining. The flow of blood and tissue normally discharged during menstruation is called the **menses** (Latin *mensis* means month).
myometrium	Muscle layer of the uterus.
neonatology	Branch of medicine that studies the disorders and care of the newborn (neonate).
obstetrics	Branch of medicine concerned with pregnancy and childbirth.
orifice	An opening.
ovarian follicle	Developing sac enclosing each ovum within the ovary. Only about 400 of these sacs mature in a woman's lifetime.
ovary	One of a pair of female organs (gonads) on each side of the pelvis. Ovaries are almond-shaped, about the size of large walnuts, and produce egg cells (ova) and hormones.
ovulation	Release of the ovum from the ovary.
ovum (*plural:* ova)	Mature egg cell (female gamete). Ova develop from immature egg cells called oocytes.

parturition	Act of giving birth.
perineum	In females, the area between the anus and the vagina.
pituitary gland	Endocrine gland at the base of the brain. It produces hormones to stimulate the ovaries.
placenta	Vascular organ that develops in the uterine wall during pregnancy. It serves as a communication between maternal and fetal bloodstreams.
pregnancy	Condition in a female of having a developing embryo and fetus in her uterus for about 40 weeks.
progesterone	Hormone produced by the corpus luteum in the ovary and the placenta of pregnant women.
puberty	Point in the life cycle at which secondary sex characteristics appear and gametes are produced.
uterine serosa	Outermost layer surrounding the uterus.
uterus	Hollow, pear-shaped muscular female organ in which the embryo and fetus develop, and from which menstruation occurs. The upper portion is the fundus; the middle portion is the corpus; and the lowermost, neck-like portion is the cervix (Figure 8-3, see page 260).
vagina	Muscular, mucosa-lined canal extending from the uterus to the exterior of the body.
vulva	External female genitalia; includes the labia, hymen, clitoris, and vaginal orifice.
zygote	Stage in prenatal development from fertilization and implantation to 2 weeks.

TERMINOLOGY

Write the meanings of the medical terms in the spaces provided.

COMBINING FORMS

COMBINING FORM	MEANING	TERMINOLOGY	MEANING
amni/o	amnion	amniocentesis _____	
		amniotic fluid _____	
		Produced by fetal membranes and the fetus.	
cervic/o	cervix, neck	endocervicitis _____	
chori/o, chorion/o	chorion	chorionic _____	
colp/o	vagina	colposcopy _____	

COMBINING FORM	MEANING	TERMINOLOGY	MEANING
culd/o	cul-de-sac	culdocentesis	*A needle is placed through the posterior wall of the vagina and fluid is withdrawn for diagnostic purposes.*
episi/o	vulva	episiotomy	*An incision through the skin of the perineum enlarges the vaginal orifice for delivery. The incision is repaired by* ***perineorrhaphy.***
galact/o	milk	galactorrhea	*Abnormal, persistent discharge of milk, commonly seen with pituitary gland tumors.*
gynec/o	woman, female	gynecomastia	*Enlargement of breasts in a male. It often occurs with puberty or aging, or the condition can be drug-related.*
hyster/o	uterus, womb	hysterectomy	***Total abdominal hysterectomy (TAH)*** *is removal of the entire uterus (including the cervix) through an abdominal incision (Figure 8-10).* ***Vaginal hysterectomy (VH)*** *is removal through the vagina.* ***Laparoscopic supracervical hysterectomy*** *(Figure 8-10) is a partial hysterectomy that preserves the cervix.*
		hysteroscopy	*A gynecologist uses an endoscope (passed through the vagina) to view the uterine cavity.*

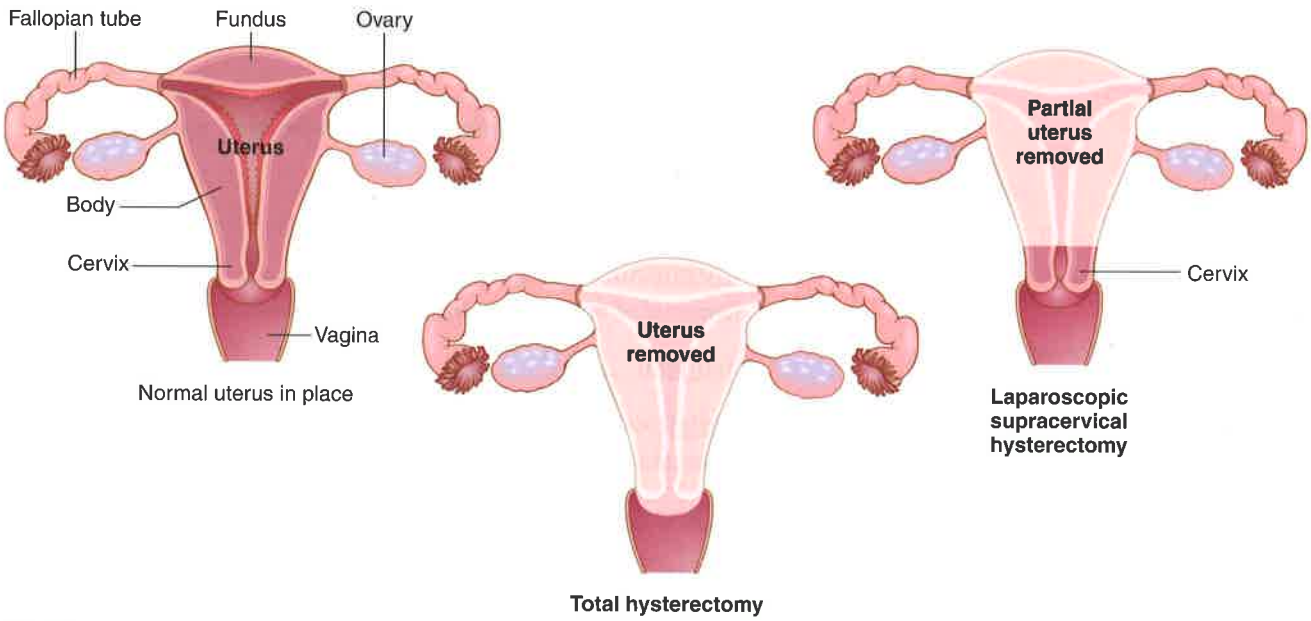

FIGURE 8–10 **Normal uterus and hysterectomies. Normal uterus** in place. **Total hysterectomy** is removal of the entire uterus—fundus, corpus, and cervix. This may be performed via an abdominal incision or vaginally. **Laparoscope supracervical hysterectomy** is removal of the top portion of the uterus (above the cervix), leaving the cervix intact. Three to five small incisions are made in the abdomen and the uterus is removed via laparoscope. Robotic hysterectomy (da Vinci surgery) is another option using small incisions, three-dimensional vision, and magnified view of the surgical site.

COMBINING FORM	MEANING	TERMINOLOGY	MEANING
lact/o	milk	lactation *The normal secretion of milk.*	
mamm/o	breast	mammary	
		mammoplasty *Includes reduction and augmentation (enlargement) operations.*	
mast/o	breast	mastitis *Usually caused by streptococcal or staphylococcal infection.*	
		mastectomy *Mastectomy procedures are discussed under carcinoma of the breast (see page 278).*	
men/o	menses, menstruation	amenorrhea *Absence of menses for 6 months or for longer than three of the patient's normal menstrual cycles.*	
		dysmenorrhea	
		oligomenorrhea *Infrequent menstrual periods or scanty menses.*	
		menorrhagia *Abnormally heavy or long menstrual periods.* ***Fibroids*** *(see page 276) are a leading cause of menorrhagia.*	
metr/o, metri/o	uterus	metrorrhagia *Bleeding between menses. Possible causes of metrorrhagia include ectopic pregnancy, cervical polyps, and ovarian and uterine tumors.*	
		menometrorrhagia *Excessive uterine bleeding during and between menstrual periods.*	
my/o, myom/o	muscle, muscle tumor	myometrium	
		myomectomy *Removal of fibroids (myomas) from the uterus.*	
nat/i	birth	neonatal	
obstetr/o	pregnancy and childbirth	obstetrics *From the Latin* obstetrix, *midwife.*	
o/o	egg	oogenesis	
		oocyte *Immature ovum.*	

COMBINING FORM	MEANING	TERMINOLOGY	MEANING
oophor/o	ovary	oophorectomy	*Oophor/o means to bear (phor/o) eggs (o/o). In a bilateral oophorectomy, both ovaries are removed.*
ov/o	egg	ovum	*Mature egg cell.*
ovari/o	ovary	ovarian	
ovul/o	egg	anovulatory	
perine/o	perineum	perineorrhaphy	
phor/o	to bear	oophoritis	
salping/o	fallopian tubes	salpingectomy	*Figure 8-11 shows a total hysterectomy with bilateral salpingo-oophorectomy (BSO).*
uter/o	uterus	uterine prolapse	
vagin/o	vagina	vaginal orifice	*An orifice is an opening.*
		vaginitis	*Bacteria and yeasts (usually* Candida*) commonly cause this infection. Use of antibiotics can change the internal environment (pH) of the vagina and destroy normally occurring bacteria, allowing yeast to grow.*
vulv/o	vulva	vulvovaginitis	

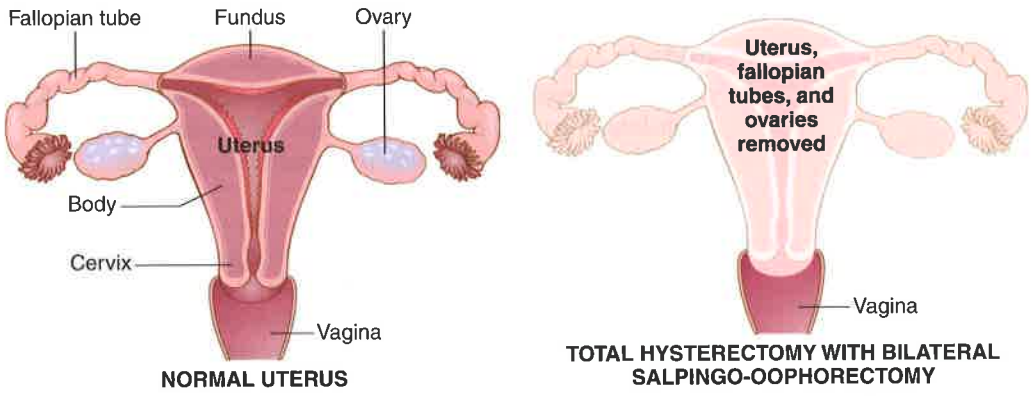

FIGURE 8–11 Normal uterus in place and total hysterectomy with bilateral salpingo-oophorectomy.

SUFFIXES

SUFFIX	MEANING	TERMINOLOGY	MEANING
-arche	beginning	menarche	
-cyesis	pregnancy	pseudocyesis	
		Pseudo- means false. No pregnancy exists, but physical changes such as weight gain and amenorrhea occur.	
-gravida	pregnant	primigravida	
		A woman during her first pregnancy (primi- means first). Gravida also is used to designate a pregnant woman, often followed by a number to indicate the number of pregnancies (gravida 1, 2, 3).	
-parous	bearing, bringing forth	primiparous	
		An adjective describing a woman who has given birth to at least one child. Para also is used as a noun, often followed by a number to indicate the number of deliveries after the 20th week of gestation (para 1, para 2, para 3). When a woman arrives in the birthing facility, her gravidity and parity are important facts to include in the medical and surgical history. For example, G2P2 is medical shorthand for a woman who has had 2 pregnancies and 2 deliveries.	
-rrhea	discharge	leukorrhea	
		This vaginal discharge is normal or becomes more yellow (purulent or pus-containing) as a sign of infection.	
		menorrhea	
-salpinx	fallopian (uterine) tube	pyosalpinx	
-tocia	labor, birth	dystocia	
		oxytocia	
		*Oxy- means rapid. The pituitary gland releases **oxytocin,** which stimulates the pregnant uterus to contract (labor begins). It also stimulates milk secretion from mammary glands.*	
-version	act of turning	cephalic version	
		*The fetus turns so that the head is the body part closest to the cervix (version can occur spontaneously or can be performed by the obstetrician). **Fetal presentation** is the manner in which the fetus appears to the examiner during delivery. A breech presentation is buttocks first, or feet first in a footling breech; a cephalic presentation is head first.*	

PREFIXES

PREFIX	MEANING	TERMINOLOGY	MEANING
dys-	painful	dyspareunia	*(dĭs-pă-ROO-nē-ă.) Pareunia means sexual intercourse.*
endo-	within	endometritis	*Usually caused by a bacterial infection.*
in-	in	involution of the uterus	*Vol- means to roll. The uterus returns to its normal nonpregnant size.*
intra-	within	intrauterine device	*Figure 8-12A shows an IUD.*
multi-	many	multipara	
		multigravida	*A woman who has been pregnant more than once.*
nulli-	no, not, none	nulligravida	
		nullipara	*Para 0. Figure 8-12B shows the cervix of a nulliparous woman and the cervix of a parous woman (who has had a vaginal delivery).*
pre-	before	prenatal	
primi-	first	primipara	
retro-	backward	retroversion	*The uterus is abnormally tilted backward. This occurs in 30% of women.*

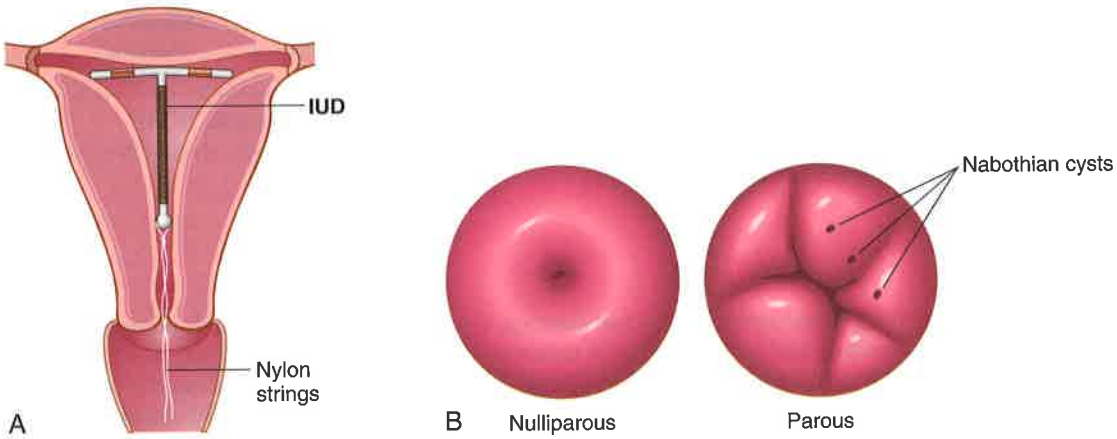

FIGURE 8–12 **(A) Intrauterine device (IUD)** in place to prevent implantation of a fertilized egg. **(B)** The cervix of a **nulliparous** woman (the os, or opening, is small and perfectly round) and the cervix of a **parous** woman (the os is wide and irregular). Nabothian cysts are normal plugged glands of the cervix, common in women who have borne children. These views would be visible under colposcopic examination.

PATHOLOGY: GYNECOLOGIC/BREAST, PREGNANCY, AND NEONATAL

GYNECOLOGIC

Uterus

8

carcinoma of the cervix

Malignant cells within the cervix (cervical cancer).

Infection with **human papillomavirus (HPV)** is the most important cause of and risk factor for cervical cancer. Other factors that may act together with HPV to increase the risk of developing cervical cancer include cigarette smoking, having multiple sexual partners, and having a weakened immune system. HPV infection is one of the most common sexually transmitted infections in the world. Some types of HPV cause genital warts (benign growths on the vulva, cervix, vagina, or anus), whereas others cause cancer, especially HPV types 16 and 18.

Although most HPV infections do not progress to cervical cancer, the risk of developing cancer increases as Pap smears become abnormal and biopsies reveal **dysplasia** (abnormal cell growth), or more seriously **carcinoma in situ (CIS)**, a localized form of cancer (Figure 8-13). Local resection **(conization)** may be necessary to treat CIS and prevent development of invasive cancer.

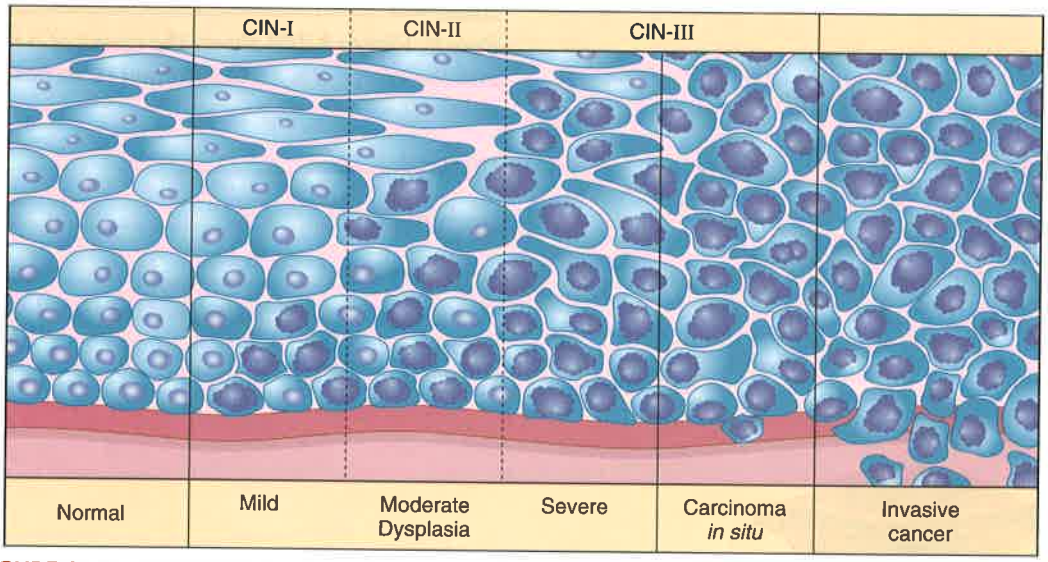

FIGURE 8–13 Preinvasive neoplastic lesions are called **cervical intraepithelial neoplasia (CIN).** Pathologists diagnose such lesions from a **Pap smear** (microscopic examination of cells scraped from cervical epithelium) and grade them as CIN I to CIN III.

HPV Vaccine

In 2006, the U.S. Food and Drug Administration approved Gardasil, the first vaccine developed to prevent cervical cancer, precancerous genital lesions, and genital warts due to human papillomavirus (HPV) types 6, 11, 16, and 18. **HPV vaccine** is recommended for girls 11 to 12 years of age. The vaccine is also recommended for females aged 13 to 26 years who have not been previously vaccinated. It is important for girls to get HPV vaccine before their first sexual contact. For these girls, the vaccine can prevent almost 100% of disease caused by the four types of HPV targeted by the vaccine. Papillomavirus also causes cancer of the throat and nasal passages and cancer of the penis. Studies are under way to determine whether vaccination of young males will prevent these cancers.

Surgical treatment for cervical cancer requires **radical (complete) hysterectomy** in which the entire uterus with ligaments, supportive tissues, and the top one third of the vagina are removed. Radiation therapy and chemotherapy are used to treat disease that has spread beyond the uterus, into the pelvis and to distant organs.

cervicitis

Inflammation of the cervix.

This condition can become chronic because the lining of the cervix is not renewed each month as is the uterine lining during menstruation.

Bacteria such as *Chlamydia trachomatis* and *Neisseria gonorrhoeae* commonly cause cervicitis. Acute cervicitis, marked by **cervical erosions** or ulcerations, appears as raw, red patches on the cervical mucosa. **Leukorrhea** (clear, white, or yellow pus-filled vaginal discharge) also is a sign of cervical erosion.

After the presence of malignancy has been excluded (by Pap smear or biopsy), **cryocauterization** (destroying tissue by freezing) of the eroded area and treatment with antibiotics may be indicated.

carcinoma of the endometrium (endometrial cancer)

Malignant tumor of the uterus (adenocarcinoma).

The most common sign of endometrial cancer is postmenopausal bleeding. This malignancy occurs more often in women exposed to high levels of estrogen, either from exogenous estrogen (pills) or estrogen-producing tumors or with obesity (estrogen is produced by fat tissue) and in nulliparous women. Physicians perform endometrial biopsy, hysteroscopy, and **dilation** (widening the cervical canal) and **curettage** (scraping the inner lining of the uterus) for diagnosis. When the cancer is confined to the uterus, surgery (hysterectomy and bilateral salpingo-oophorectomy) is curative. Radiation oncologists administer radiation therapy as additional treatment.

endometriosis

Endometrial tissue located outside the uterus.

Endometrial tissue found in ovaries, fallopian tubes, supporting ligaments or small intestine causes inflammation and scar tissue, with dysmenorrhea, pelvic pain, infertility (inability to become pregnant), and dyspareunia (painful intercourse). Most cases are the result of proliferation (growth) of bits of menstrual endometrium that have passed backward through the **lumen** (opening) of the fallopian tube and into the peritoneal cavity. Often, when disease affects the ovaries, large blood-filled cysts (endometriomas, or "chocolate cysts") develop. Treatment ranges from symptomatic relief of pain and hormonal drugs that suppress the menstrual cycle to surgical removal of ectopic endometrial tissue and hysterectomy.

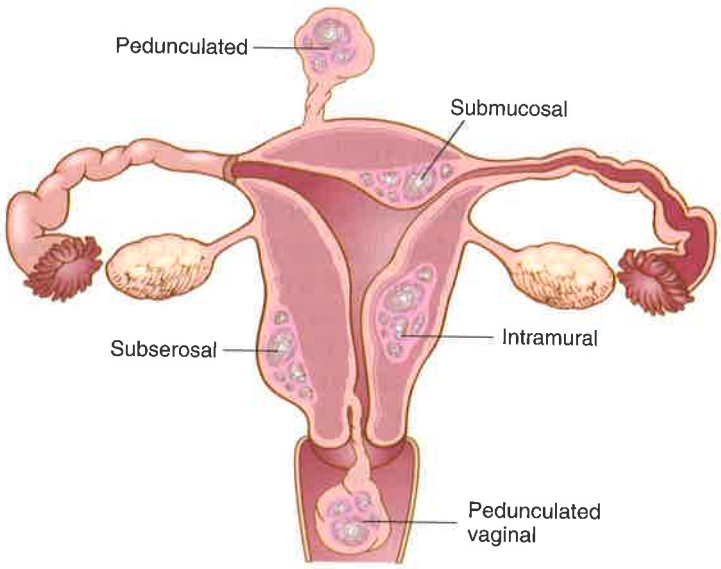

FIGURE 8–14 Location of uterine fibroids (leiomyomas). Pedunculated growths protrude on stalks. A **subserosal** mass lies under the serosal (outermost) layer of the uterus. A **submucosal** leiomyoma grows under the mucosal (innermost) layer. **Intramural** (mural means wall) masses arise within the muscular uterine wall. (Modified from Damjanov I: Pathology for the Health-Related Professions, 3rd ed., Philadelphia, Saunders, 2006, p. 369.)

fibroids

Benign tumors in the uterus.

Fibroids, also called **leiomyomata** or **leiomyomas** (lei/o = smooth, my/o = muscle, and -oma = tumor), are composed of fibrous tissue and muscle. If fibroids grow too large and cause symptoms such as metrorrhagia, pelvic pain, or menorrhagia, hysterectomy or myomectomy is indicated. Fibroid removal without surgery includes **uterine artery embolization (UAE),** in which tiny pellets are injected into a uterine artery supplying blood to fibroids. Blood flow is blocked by the pellets (emboli), causing fibroids to shrink in size. Figure 8-14 shows the location of uterine fibroids.

Ovaries

ovarian carcinoma

Malignant tumor of the ovary (adenocarcinoma).

Carcinomas of the ovary account for more deaths than those of cancers of the cervix and of the uterus together. The tumor, which may be cystic or solid in consistency, usually is discovered in an advanced stage as an abdominal mass and may produce few symptoms in its early stages. In most patients, the disease metastasizes beyond the ovary before diagnosis and often causes abdominal ascites (accumulation of fluid in the abdominal cavity). Treatment is surgical removal of all visible tumor including a total abdominal hysterectomy and bilateral salpingo-oophorectomy followed by chemotherapy. A protein marker produced by tumor cells, CA 125, can be measured in the bloodstream to assess effectiveness of treatment.

There are mutations (changes) in genes that make some women more susceptible to developing ovarian and breast cancer. These mutations are ***BRCA1*** and ***BRCA2*** (short for breast cancer 1 and breast cancer 2). Women with a strong family history of ovarian cancer (with multiple members of the family affected) should seek genetic counseling to determine if they should be tested for this inherited defect.

ovarian cysts

Collections of fluid within a sac (cyst) in the ovary.

Some cysts are benign and lined by typical cells of the ovary. These cysts originate in unruptured ovarian follicles (follicular cysts) or in follicles that have ruptured and have immediately been sealed (luteal cysts). Other cysts are malignant and lined with atypical or tumor cells (**cystadenoma** and **cystadenocarcinoma**). Physicians decide to remove these cysts to distinguish between benign and malignant tumors.

Dermoid cysts are lined with a variety of cell types, including skin, hair, teeth, and cartilage, and arise from immature egg cells in the ovary. Because of the strange assortment of tissue types in the tumor (Figure 8-15), this tumor often is called benign cystic **teratoma** (terat/o = monster) or a **mature teratoma.** Surgical removal of the cyst cures the condition. Cysts are bilateral 15% of the time.

Fallopian Tubes

pelvic inflammatory disease (PID)

Inflammation and infection of organs in the pelvic region; salpingitis, oophoritis, endometritis, endocervicitis.

The leading causes of PID are bacterial infections such as gonorrhea and chlamydial infection (common sexually transmitted diseases [STDs]). Repetitive episodes of these infections lead to formation of adhesions and scarring within the fallopian tubes. After PID, women have an increased risk of ectopic pregnancy and infertility. Signs and symptoms include fever, foul-smelling vaginal discharge, abdominal pain in the left and right lower quadrants (LLQ and RLQ), and tenderness to **palpation** (examining by touch) of the cervix. Antibiotics treat PID. More information on STDs in women and men can be found in Chapter 9 (page 322).

FIGURE 8–15 **Dermoid cyst of the ovary** with hair, skin, and teeth. (Courtesy Dr. Elizabeth Chabner Thompson.)

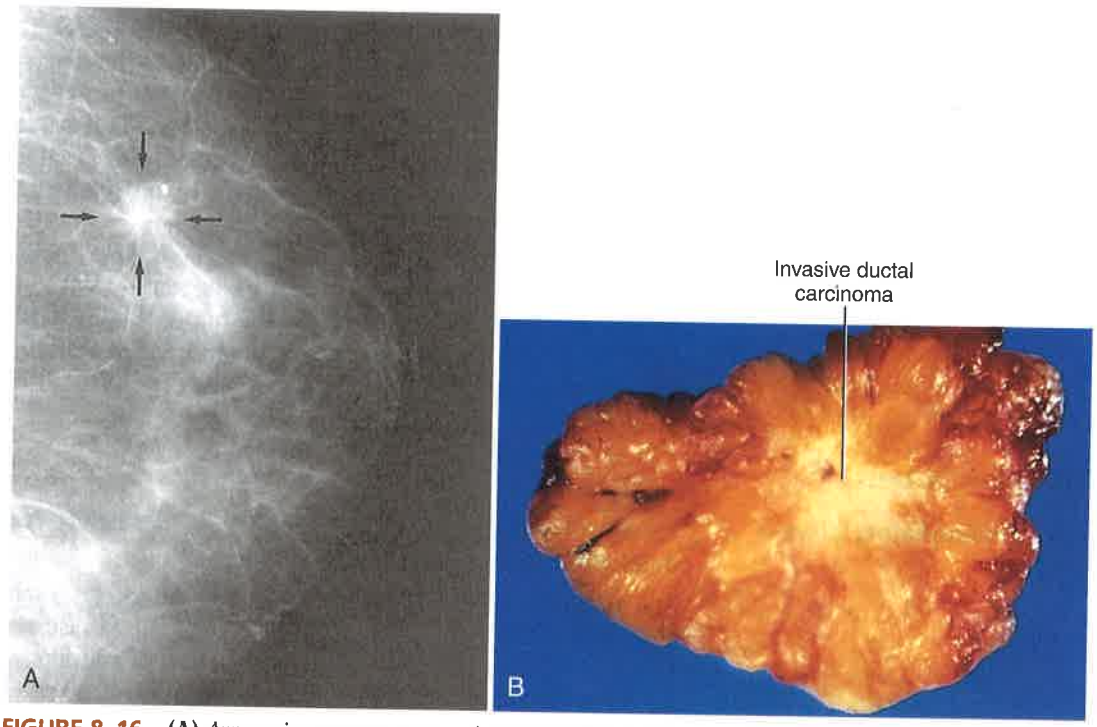

FIGURE 8–16 **(A)** *Arrows* in **mammogram** point to invasive carcinoma of the breast. A dense white fragment of calcium is seen at 2 o'clock in the mass; calcifications like this are frequently a sign of cancer. **(B)** Cut section of **invasive ductal carcinoma** of the breast. (From Kumar V, Abbas AK, Fausto N: Robbins and Cotran Pathologic Basis of Disease, 7th ed., Philadelphia, Saunders, 2005, p. 1143.)

BREAST

carcinoma of the breast (breast cancer)

Malignant tumor of the breast (arising from milk glands and ducts).

The most common type of breast cancer is **invasive ductal carcinoma.** Figure 8-16A shows the tumor on a mammogram. Figure 8-16B shows a cut section of an invasive ductal carcinoma. Other histopathologic (histo- means tissue) types are **lobular** and **medullary carcinoma** of the breast.

Breast cancer spreads first to lymph nodes in the axilla (armpit) adjacent to the affected breast and then to the skin and chest wall. From the lymph nodes it also may metastasize to other body organs, including bone, liver, lung, and brain. The diagnosis is first established by biopsy, either needle core or needle aspiration, or surgical removal of a specimen.

For small primary tumors, the lump with immediately surrounding tissue can be removed **(lumpectomy).** To determine whether the tumor has spread to lymph nodes, a **sentinel node biopsy (SNB)** is performed. For this procedure, a blue dye or a radioisotope is injected into the tumor site and tracks to the axillary (underarm) lymph nodes. By visualizing the path of the dye or radioactivity, it is possible to identify the lymph nodes most likely to contain tumor. These lymph nodes, the sentinel nodes, are removed first, and if tissue studies give negative results, the procedure can be stopped at this point. After lumpectomy, radiation therapy to the breast and to any involved lymph nodes then follows, to kill remaining tumor cells.

An alternative surgical procedure is **mastectomy** (Figure 8-17), which is removal of the breast. After either lumpectomy or mastectomy if lymph nodes are involved with cancer, adjuvant (aiding) chemotherapy is given to prevent recurrence of the tumor.

After surgery, further treatment may be indicated to prevent recurrence. To determine what kind of treatment to use, it is important to test the breast cancer

FIGURE 8–17 **Surgical scar, mastectomy,** right breast. A **modified radical mastectomy** removes the breast and axillary lymph nodes (usually 20 to 30 nodes). (Courtesy Dr. Elizabeth Chabner Thompson.)

tumor for the presence of **estrogen receptors (ERs).** These receptor proteins indicate that the tumor will respond to hormonal therapy. If metastases should subsequently develop, this information will be valuable in selecting further treatment. There are two types of drugs that block the effects of estrogen and thereby kill ER-positive breast cancer cells. Drugs of the first type directly block the ER reception. An example is **tamoxifen.** Drugs of the second type block the production of estrogen by inhibiting the enzyme aromatase. These **aromatase inhibitors** are particularly useful in treating postmenopausal women. Examples are anastrozole (Arimidex) and letrozole (Femara).

A second receptor protein, **her-2/neu,** is found in some breast cancers and signals a high risk of tumor recurrence. **Herceptin,** an antibody that binds to and blocks her-2/neu, is effective in stopping growth when used with chemotherapy.

Testing for hereditary mutations, ***BRCA1*** and ***BRCA2***, is advised for women with a strong family history of breast cancer. Some women who test positively for the breast cancer genes elect to have prophylactic (preventive) bilateral mastectomy with reconstruction.

fibrocystic disease

Numerous small sacs of fibrous connective tissue and fluid in the breast.

Women with this common benign condition notice a nodular (lumpy) consistency of the breast, often associated with premenstrual tenderness and fullness. Mammography and surgical biopsy are often indicated to differentiate fibrocystic changes from carcinoma of the breast.

PREGNANCY

abruptio placentae

Premature separation of the implanted placenta.

Abruptio placentae (Latin *ab*, away from; *ruptus*, ruptured) occurs because of trauma, such as a fall, or secondary to vascular insufficiency resulting from hypertension or preeclampsia (see page 280). Signs and symptoms of acute abruption include sudden searing (burning) abdominal pain and bleeding. It is an obstetric emergency.

choriocarcinoma

Malignant tumor of the placenta.

The tumor may appear with vaginal bleeding, a positive result on a pregnancy test, and enlarged ovaries on examination. It may spread to lungs and other organs. Treatment is with dilation and curettage (D&C) and chemotherapy.

ectopic pregnancy

Implantation of the fertilized egg in any site other than the normal uterine location.

The condition occurs in 15% of pregnancies, and 90% of these occur in the fallopian tubes **(tubal pregnancy).** Rupture of the ectopic implant within the fallopian tube can lead to massive abdominal bleeding and death. Surgeons can remove the implant, or treatment with medication (methotrexate) can destroy it, thereby preserving the fallopian tube before rupture occurs. Other sites of ectopic pregnancy include the ovaries and abdominal cavity; whatever the location, ectopic pregnancy always constitutes a surgical emergency.

multiple gestation

More than one fetus inside the uterus.

Multiple births are increasing in the United States (often because of in vitro fertilization procedures; see page 287). These pregnancies are at higher risk for preterm delivery, growth restriction, high blood pressure, and diabetes.

placenta previa

Implantation of the placenta over the cervical opening or in the lower region of the uterus (Figure 8-18).

This condition can result in less oxygen supply to the fetus and increased risk of hemorrhage and infection for the mother. Maternal signs and symptoms include painless bleeding, hemorrhage, and premature labor. Cesarean delivery usually is recommended.

preeclampsia

Abnormal condition associated with pregnancy, marked by high blood pressure, proteinuria, edema, and headache.

Mild preeclampsia can be managed by bed rest and close monitoring of blood pressure. Women with severe preeclampsia need treatment with medications such as magnesium sulfate to prevent seizures, and the baby is delivered as quickly as possible. The Greek word *eklampein* means to shine forth, referring to the convulsions and hypertension—typically with visual symptoms of flashing lights—that accompany the condition.

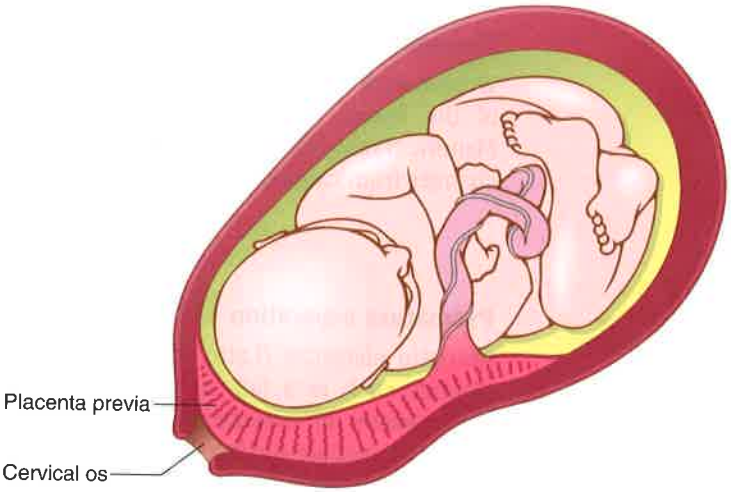

FIGURE 8–18 Placenta previa. Previa means before or in the front of.

APGAR SCORING CHART

SIGN	0	1	2
Heart rate	Absent	Below 100	Over 100
Respiratory effort	Absent	Slow, irregular	Good, crying
Muscle tone	Limp	Some flexion of extremities	Active motion
Response to catheter in nostril (tested after oropharynx is clear)	No response	Grimace	Cough or sneeze
Color	Blue, pale	Body pink, extremities blue	Completely pink

FIGURE 8–19 Apgar scoring chart. This test is named for anesthesiologist Virginia Apgar (1909-1974), who devised it in 1953. Dr. Joseph Butterfield, in 1963, introduced an "APGAR" acronym as a mnemonic (memory device): **A**ppearance (color), **P**ulse (heart rate), **G**rimace (response to catheter in nostril), **A**ctivity (muscle tone), and **R**espiration (respiratory effort). (Modified from O'Toole M [ed]: Miller-Keane Encyclopedia & Dictionary of Medicine, Nursing & Allied Health, 7th ed., Philadelphia, Saunders, 2003, p. 136.)

NEONATAL

The following terms describe conditions or symptoms that can affect the newborn. The **Apgar score** (Figure 8-19) is a system of scoring an infant's physical condition 1 and 5 minutes after birth. **Heart rate, respiration, color, muscle tone,** and **response to stimuli** each are rated 0, 1, or 2. The maximum total score is 10. Infants with Apgar scores below 7 require special immediate medical attention such as suctioning of the airways or oxygen to help breathing.

Down syndrome

Chromosomal abnormality (trisomy 21) results in mental retardation, retarded growth, a flat face with a short nose, low-set ears, and slanted eyes.

erythroblastosis fetalis

Hemolytic disease in the newborn (HND) caused by a blood group (Rh factor) incompatibility between the mother and the fetus. See explanation in Chapter 4, page 119.

hyaline membrane disease

Acute lung disease commonly seen in the premature newborn.

This condition, also called **respiratory distress syndrome of the newborn (RDS),** is caused by deficiency of **surfactant,** a protein necessary for proper lung function. Surfactant can be administered to the newborn to cure the condition. Hyaline refers to the shiny (hyaline means glassy) membrane that forms in the lung sacs.

hydrocephalus

Accumulation of fluid in the spaces of the brain.

In an infant, the entire head can enlarge because the bones of the skull do not completely fuse together at birth. Infants normally have a soft spot or **fontanelle** between the cranial bones that allows for some swelling during the birth of the baby. Hydrocephalus occurs because of a problem in the circulation of fluid within the brain and spinal cord, resulting in fluid accumulation.

meconium aspiration syndrome

Abnormal inhalation of meconium (first stool) produced by a fetus or newborn.

Meconium, a thick, sticky, greenish to black substance, is actually the first stool of the fetus and newborn. If it is inhaled during birth, meconium can block air passages and cause respiratory distress as the lungs fail to expand. **Meconium ileus** is obstruction of the small intestine in the newborn caused by impaction of thick, dry meconium near the ileocecal valve.

pyloric stenosis

Narrowing of the opening of the stomach to the duodenum.

Present at birth; surgical repair of the pyloric opening may be necessary.

CLINICAL TESTS AND PROCEDURES

CLINICAL TESTS

Pap test

Microscopic examination of stained cells removed from the vagina and cervix.

After inserting a vaginal **speculum** (instrument to hold apart the vaginal walls), the physician uses a small spatula to remove exfoliated (peeling and sloughing off) cells from the cervix and vagina (Figure 8-20). Microscopic analysis of the cell smear detects cervical or vaginal cellular abnormalities.

pregnancy test

Blood or urine test to detect the presence of hCG.

PROCEDURES

X-Ray Studies

hysterosalpingography (HSG)

X-ray imaging of the uterus and fallopian tubes after injection of contrast material.

This radiologic procedure is used to evaluate tubal patency (adequate opening) and uterine cavity abnormalities.

mammography

X-ray imaging of the breast.

Women are advised to have a baseline mammogram at 40 years of age for later comparison if needed. A mammogram every year is recommended for women older than 40, to screen for breast cancer. Figure 8-21 illustrates mammography.

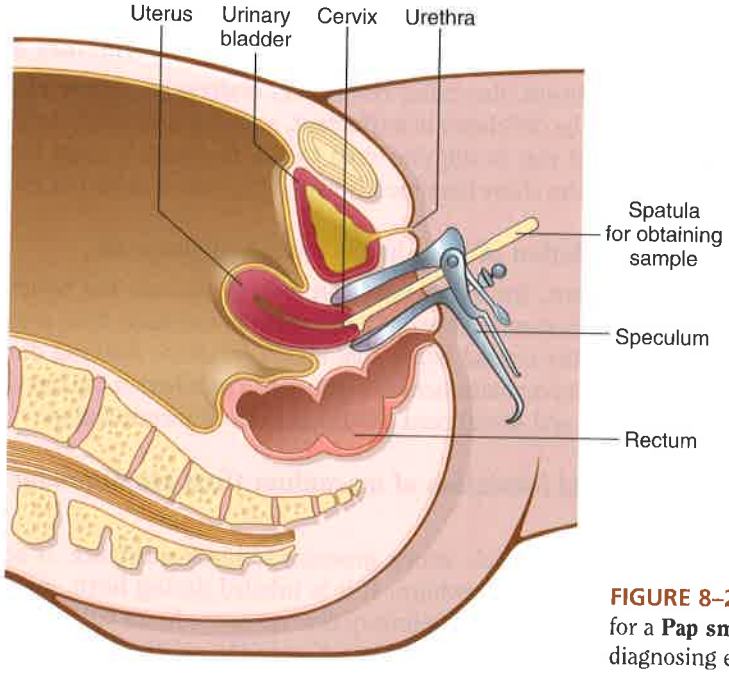

FIGURE 8–20 Method of obtaining a sample for a **Pap smear.** The test is 95% accurate in diagnosing early carcinoma of the cervix.

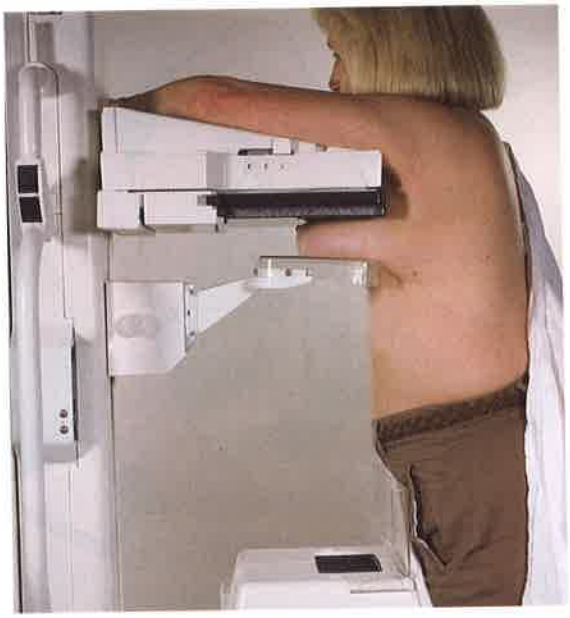

FIGURE 8–21 Mammography. The machine compresses the breast and x-ray pictures (top to bottom and lateral) are taken. (From Frank ED et al: Merrill's Atlas of Radiographic Positioning & Procedures, 11th ed., St. Louis, Mosby, 2007, vol. 2, p. 458.)

A new method of mammography is **digital tomosynthesis.** In this procedure, an x-ray tube moves in an arc around the breast as several images are taken. These images are sent to a computer and clear, highly focused three-dimensional pictures are produced. In addition to being less painful, this procedure makes breast cancer easier to find in dense breast tissue.

Ultrasound Examination and Magnetic Resonance Imaging (MRI)

breast ultrasound imaging and breast MRI

Technologies using sound waves and magnetic waves to create images of breast tissue.

These imaging techniques confirm the presence of a mass and can distinguish a benign cyst from a malignancy. MRI is very useful in detecting masses in young women with dense breasts or in women with a strong family history and at high risk for development of breast cancer. Breast ultrasound imaging is useful to evaluate a specific area of cancer on a mammogram.

pelvic ultrasonography

Recording images of sound waves as they bounce off organs in the pelvic region.

This technique can evaluate fetal size, fetal maturity, and organ development, as well as fetal and placental position. Uterine tumors and other pelvic masses, including abscesses, also are diagnosed by ultrasonography. **Transvaginal ultrasound** allows the radiologist a closer, sharper look at organs within the pelvis. The sound probe is placed in the vagina instead of across the pelvis or abdomen; this method is best used to evaluate fluid-filled cysts.

Gynecologic Procedures

aspiration

Withdrawal of fluid from a cavity or sac with an instrument using suction.

Aspiration needle biopsy is a valuable evaluation technique for patients with breast disease.

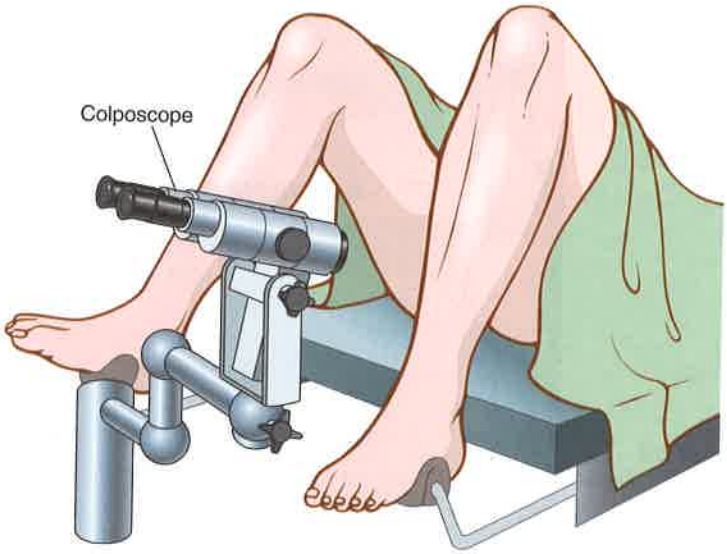

FIGURE 8–22 **Colposcopy** is used to evaluate a patient with an abnormal Pap smear. For this examination, the woman lies in the dorsal lithotomy position. This is the same position used to remove a urinary tract stone (lithotomy means incision to remove a stone).

cauterization

Destruction of tissue by burning.

Destruction of abnormal tissue with chemicals (silver nitrate), dry ice, or an electrically heated instrument. Cauterization is used to treat cervical dysplasia or cervical erosion. The **loop electrocautery excision procedure (LEEP)** (see Figure 8-23A) is used to further assess and often treat abnormal cervical tissue.

colposcopy

Visual examination of the vagina and cervix using a colposcope.

A colposcope is a lighted magnifying instrument resembling a small, mounted pair of binoculars. Gynecologists prefer colposcopy for pelvic examination when cervical dysplasia is present because it identifies the specific areas of abnormal cells. A biopsy specimen can then be taken for more accurate diagnosis (Figure 8-22).

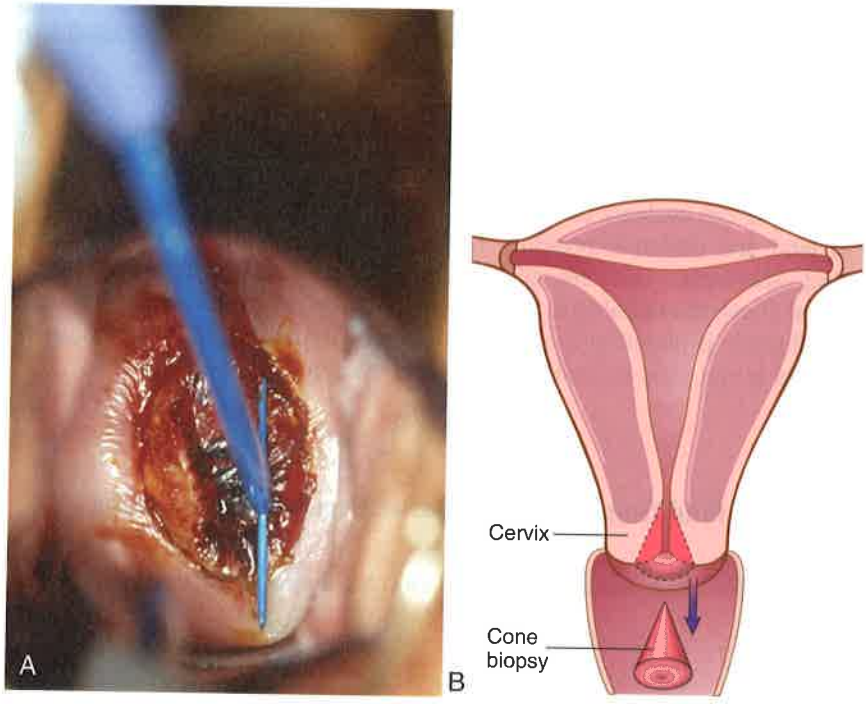

FIGURE 8–23 **(A) Cervical loop electrocautery excision procedure (LEEP)** for cone biopsy. **(B)** Surgical removal of cone biopsy specimen. **(A,** Courtesy Dr. A. K. Goodman, Massachusetts General Hospital, Boston.)

conization

Removal of a cone-shaped section (cone biopsy) of the cervix.

The physician resects the tissue using a **LEEP (loop electrocautery excision procedure),** or with a carbon dioxide laser or surgical knife (scalpel). Figure 8-23A shows conization with LEEP, and Figure 8-23B shows the cone biopsy specimen removed surgically.

cryosurgery

Use of cold temperatures to destroy tissue.

A liquid nitrogen probe produces the freezing (cry/o means cold) temperature. Also called **cryocauterization.**

culdocentesis

Needle aspiration of fluid from the cul-de-sac.

The physician inserts a needle through the vagina into the cul-de-sac. The presence of blood may indicate a ruptured ectopic pregnancy or ruptured ovarian cyst.

dilation (dilatation) and curettage (D&C)

Widening the cervix and scraping off the endometrial lining of the uterus.

Dilation is accomplished by inserting a series of probes of increasing size. A **curet** (metal loop at the end of a long, thin handle) is then used to sample the uterine lining. This procedure helps diagnose uterine disease and can temporarily halt prolonged or heavy uterine bleeding. When necessary, a D&C is used to remove the tissue during a spontaneous or therapeutic abortion (Figure 8-24).

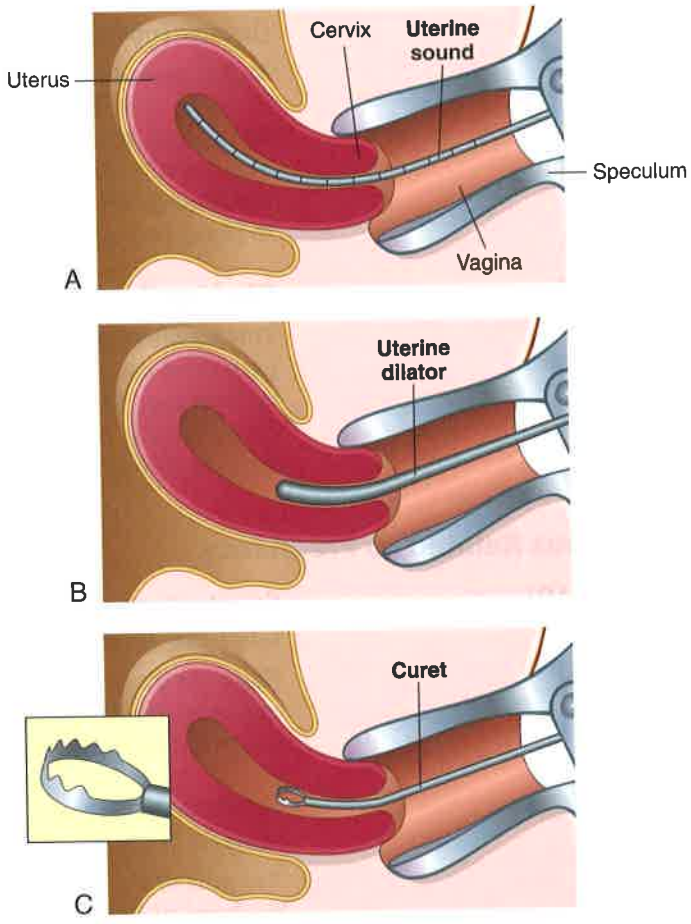

FIGURE 8–24 Dilation and curettage (D&C) of the uterus. (A) The uterine cavity is explored with a **uterine sound** (a slender instrument used to measure the depth of the uterus, to prevent perforation during dilation. **(B) Uterine dilators** (Hanks or Hagar) in graduated sizes are used to gradually dilate the cervix. **(C)** The uterus is gently curetted and specimens are collected.

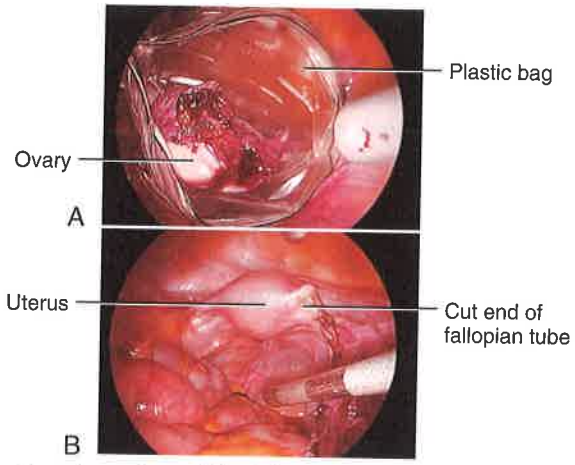

FIGURE 8–25 **Laparoscopic oophorectomy. (A)** Notice the ovary placed in a plastic bag. The bag was inserted through the laparoscope and then opened, and the ovary was placed inside. Both are extracted through the laparoscope, leaving the uterus and the cut end of the fallopian tube **(B)**. (Courtesy Dr. A. K. Goodman, Massachusetts General Hospital, Boston.)

exenteration

Removal of internal organs within a cavity.

Pelvic exenteration is removal of the organs and adjacent structures of the pelvis.

laparoscopy

Visual examination of the abdominal cavity using an endoscope (laparoscope).

In this procedure, a form of **minimally invasive surgery (MIS),** small incisions (5 to 10 mm long) are made near a woman's navel for introduction of the laparoscope and other instruments. Uses of laparoscopy include inspection and removal of ovaries and fallopian tubes, diagnosis and treatment of endometriosis, and removal of fibroids. Laparoscopy also is used to perform subtotal (cervix is left in place) and total hysterectomies (Figure 8-25).

tubal ligation

Blocking the fallopian tubes to prevent fertilization from occurring.

This **sterilization** procedure (making an individual incapable of reproduction) is performed using laparoscopy or through a hysteroscope inserted via the cervical os (opening). **Ligation** means tying off and doesn't pertain solely to the fallopian tubes—which may be "tied" using clips or bands, or by surgically cutting or burning through the tissue.

Procedures Related to Pregnancy

abortion (AB)

Spontaneous or induced termination of pregnancy before the embryo or fetus can exist on its own.

Major methods for abortion include vaginal evacuation by D&C or vacuum aspiration (suction) and stimulation of uterine contractions by injection of saline (salt solution) into the amniotic cavity (in second-trimester pregnancies).

amniocentesis

Needle puncture of the amniotic sac to withdraw amniotic fluid for analysis (Figure 8-26).

The cells of the fetus, found in the fluid, are cultured (grown), and cytologic and biochemical studies are performed to check fetal chromosomes, concentrations of proteins and bilirubin, and fetal maturation.

FIGURE 8–26 **Amniocentesis.** The obstetrician places a long needle through the pregnant woman's abdominal wall into the amniotic cavity. Needle placement (avoiding the fetus and the placenta) is guided by concurrent ultrasound imaging, performed using the transducer in the radiologist's hand. The yellow amniotic fluid is aspirated into the syringe attached to the needle. This procedure took place in the 16th week of pregnancy. The indication for the amniocentesis was a low AFP (alpha-fetoprotein) level. This suggested a higher risk of Down syndrome in the baby. Karyotype analysis (received 10 days later) showed normal chromosome configuration.

cesarean section

Surgical incision of the abdominal wall and uterus to deliver a fetus.

Indications for cesarean section include cephalopelvic disproportion (the baby's head is too big for the mother's birth canal), abruptio placentae or placenta previa, fetal distress (fetal hypoxia), and breech or shoulder presentation. The name comes from a law during the time of Julius Caesar requiring removal of a fetus before a deceased pregnant woman could be buried.

chorionic villus sampling (CVS)

Sampling of placental tissues (chorionic villi) for prenatal diagnosis.

The sample of tissue is removed with a catheter inserted into the uterus. The procedure can be performed earlier than amniocentesis, at about 9 to 12 weeks of gestation.

fetal monitoring

Continuous recording of the fetal heart rate and maternal uterine contractions to reduce fetal distress during labor.

in vitro fertilization (IVF)

Egg and sperm cells are combined outside the body in a laboratory dish (in vitro) to facilitate fertilization.

After an incubation period of 48 to 72 hours, the fertilized ova are injected into the uterus through the cervix. (Latin *in vitro* means in glass, as used for laboratory containers.)

pelvimetry

Measurement of the dimensions of the maternal pelvis.

Pelvimetry helps determine if the mother's pelvis will allow passage of the fetus through the birth canal. This examination is important during protracted labor or with breech presentation.

ABBREVIATIONS

AB	abortion
AFP	alpha-fetoprotein—high levels in amniotic fluid of fetus or maternal serum indicate increased risk of neurologic birth defects in the infant.
ASCUS	atypical squamous cells of undetermined significance—the Pap smear is abnormal but does not meet the criteria for a specific lesion.
AUB	abnormal uterine bleeding
BRCA1 BRCA2	breast cancer 1 and 2—genetic mutations associated with increased risk for breast cancer
BSE	breast self-examination
CA 125	protein marker elevated in ovarian cancer (normal range of values is 0 to 35)
C-section	cesarean section
CIN	cervical intraepithelial neoplasia
CIS	carcinoma in situ
CS	cesarean section
CVS	chorionic villus sampling
Cx	cervix
D&C	dilation (dilatation) and curettage
DCIS	ductal carcinoma in situ; a precancerous breast lesion that indicates a higher risk for invasive ductal breast cancer
DES	diethylstilbestrol—an estrogen compound used in the treatment of menopausal problems involving estrogen deficiency; if administered during pregnancy, it has been found to be related to subsequent tumors in the daughters (rarely in sons) of mothers so treated.
DUB	dysfunctional uterine bleeding
ECC	endocervical curettage
EDC	estimated date of confinement
EMB	endometrial biopsy
FHR	fetal heart rate
FSH	follicle-stimulating hormone
G	gravida (pregnant)
GnRH	gonadotropin-releasing hormone—secreted by the hypothalamus to stimulate release of FSH and LH from the pituitary gland
GYN	gynecology
hCG *or* HCG	human chorionic gonadotropin
HDN	hemolytic disease of the newborn
HPV	human papillomavirus
HRT	hormone replacement therapy
HSG	hysterosalpingography
IUD	intrauterine device; contraceptive
IVF	in vitro fertilization
LAVH	laparoscopically assisted vaginal hysterectomy
LEEP	loop electrocautery excision procedure
LH	luteinizing hormone
LMP	last menstrual period
LSH	laparoscopic supracervical hysterectomy
multip	multipara; multiparous
OB	obstetrics
OCPs	oral contraceptive pills
para 2-0-1-2	a woman's reproductive history: 2 full-term infants, 0 preterm, 1 abortion, and 2 living children
Pap test	Papanicolaou smear—test for cervical or vaginal cancer
Path	pathology
PID	pelvic inflammatory disease
PMS	premenstrual syndrome
primip	primipara; primiparous
RDS	respiratory distress syndrome of the newborn
SLN biopsy *or* SNB	sentinel lymph node biopsy—blue dye or a radioisotope (or both) identifies the first lymph node draining the breast lymphatics
TAH-BSO	total abdominal hysterectomy with bilateral salpingo-oophorectomy
TRAM flap	trans–rectus abdominis musculocutaneous flap—for breast reconstruction
UAE	uterine artery embolization
VH	vaginal hysterectomy

PRACTICAL APPLICATIONS

This section contains an actual operative report and brief excerpts from other medical records using words that you have studied in this and previous chapters. Explanations of more difficult terms are added in brackets. Answers for the matching exercise are on page 302.

OPERATIVE REPORT

Preoperative diagnosis: Menorrhagia, leiomyomata

Anesthetic: General

Material forwarded to laboratory for examination:

A. Endocervical curettings
B. Endometrial curettings

Operation performed: Dilation and curettage of the uterus

With the patient in the dorsal lithotomy position [legs are flexed on the thighs, thighs flexed on the abdomen and abducted] and sterilely prepped and draped, manual examination of the uterus revealed it to be 6- to 8-week size, retroflexed; no adnexal masses noted. The anterior lip of the cervix was then grasped with a tenaculum [a hook-like surgical instrument for grasping and holding parts]. The cervix was dilated up to a #20 Hank's dilator. The uterus was sounded [depth measured] up to 4 inches. A sharp curettage of the endocervix showed only a scant amount of tissue. With a sharp curet, the uterus was curetted in a clockwise fashion with an irregularity noted in the posterior floor. A large amount of endometrial tissue was removed. The patient tolerated the procedure well.

Operative diagnosis: Leiomyomata uteri

Recommendation: Hysterectomy for myomectomy

SENTENCES USING MEDICAL TERMINOLOGY

1. *Mammogram report:* The breast parenchyma [essential tissue] is symmetrical bilaterally. There are no abnormal masses or calcifications in either breast. The axillae are normal.
2. This is a 43-year-old gravida 3 para 2 with premature ovarian failure and now on HRT. She has history of endocervical atypia [cells are not normal or typical] secondary to chlamydial infection, which is now being treated.
3. The patient is a 40-year-old gravida 3, para 2 admitted for exploratory laparotomy to remove and evaluate a 10-cm left adnexal mass. Discharge diagnosis: (1) endometriosis, left ovary; (2) benign cystic teratoma [dermoid cyst], left ovary.
4. *History:* 51-year-old G3 P3; LMP early 40s; on HRT until age 49 when diagnosed with carcinoma of breast; treated with mastectomy and tamoxifen. Followed by ultrasounds showing slightly thickened 9-10 mm endometrium. No bleeding.

   Operative findings: office endometrial biopsy, scant tissue

   Clinical diagnosis: rule out hyperplasia

OPERATING ROOM SCHEDULE

The operating room schedule for one day in a large general hospital listed six different gynecologic procedures. Match the surgical procedures in Column I with the indications for surgery in Column II. Write the letter of the indication in the blanks provided.

COLUMN I

1. Conization of the cervix ____
2. Vaginal hysterectomy with colporrhaphy ____
3. TAH-BSO, pelvic and periaortic lymphadenectomy ____
4. Exploratory laparotomy for uterine myomectomy ____
5. Left oophorectomy ____
6. Lumpectomy with SLN biopsy ____

COLUMN II

A. LLQ pain; ovarian mass on pelvic ultrasound
B. Fibroids
C. Endometrial carcinoma
D. Small invasive ductal carcinoma of the breast
E. Suspected cervical cancer
F. Uterine prolapse

CONTRACEPTIVE CHOICES

Review and compare the various birth control options available today.

Method	Unintended Pregnancy Rates: Typical Use / Perfect Use	Protection against STDs and HIV Infection
1. Abstinence—no sexual intercourse	0% / 0%	100%
2. Cervical cap—inserted by doctor or nurse	16% / 9%	none
3. Condom—male	15% / 2%	some
4. Condom—female	21% / 5%	some
5. Diaphragm (with spermicide)	16% / 6%	none
6. Film and foam (with spermicide)	29% / 18%	none
7. Implant—inserted into upper arm; releases hormones; effective for 3 years	0.05% / 0.05%	none
8. Injectable—Depo-Provera given every 3 months	3% / 3%	none
9. Intrauterine (IUD): copper T—IUD; LNG—IUS	less than 1%	none
10. Oral contraceptives (birth control pills)	8% / 3%	none
11. Patch—applied to skin weekly	8% / 3%	none
12. Ring—inserted in vagina; effective for 1 month	8% / less than 1%	none
13. Sponge—used by women who have never given birth	16% / 9%	none
14. Suppositories—inserted in vagina (with spermicide)	29% / 15%	none
15. Withdrawal	27% / 4%	none