VAGINA

Sex organ that is a part of the female genital tract having two primary functions: sexual intercourse and childbirth.

About Vagina

Function

Secretions
The vagina provides a path for menstrual blood and tissue to leave the body. In industrial societies, tampons, menstrual cups and sanitary napkins may be used to absorb or capture these fluids. Vaginal secretions are primarily from the uterus, cervix, and transudation of the vaginal epithelium in addition to miniscule vaginal lubrication from the Bartholin's glands upon sexual arousal.

Female sexuality
The concentration of the nerve endings near the entrance of the vagina (the lower third) usually provide pleasurable vaginal sensations when stimulated during sexual activity, and many women additionally derive pleasure from a feeling of closeness and fullness during penetration of the vagina. The vagina as a whole, however, lacks nerve endings, which commonly hinders a woman's ability to receive sufficient sexual stimulation, including orgasm, solely from penetration of the vagina. Although some scientific examinations of vaginal wall innervation indicate no single area with a greater density of nerve endings, or that only some women have a greater density of nerve endings in the anterior vaginal wall, heightened sensitivity in the anterior vaginal wall is common among women.

These cases indicate that the outer one-third of the vagina, especially near the opening, contains the majority of the vaginal nerve endings, making it more sensitive to touch than the inner (or upper) two-thirds of the vaginal barrel. This factor makes the process of childbirth significantly less painful, because an increased number of nerve endings means that there is an increased possibility for pain.
Childbirth

The vagina provides a channel to deliver a newborn to its independent life outside the body of the mother. When the body prepares for childbirth, the cervix softens, thins, moves forward to face anteriorly, and may begin to open. This allows the fetus to settle or "drop" into the pelvis. When the fetus settles into the pelvis, this may result in pain in the sciatic nerves, increased vaginal discharge, and increased urinary frequency. The fetus begins to lose the support of the cervix when uterine contractions begin. With cervical dilation reaching a diameter of more than 10 cm (4 in) to accommodate the head of the fetus, the head moves from the uterus to the vagina. The elasticity of the vagina allows it to stretch to many times its normal diameter in order to deliver the child.

Births are usually successful vaginal births, but there are sometimes complications and a woman may undergo a caesarean section instead of a vaginal delivery. The vaginal mucosa has an abnormal accumulation of fluid (edematous) and is thin, with few rugae, a little after birth. The mucosa thickens and rugae return in approximately three weeks once the ovaries regain usual function and estrogen flow is restored. The vaginal opening gapes and is relaxed, until it returns to its approximate pre-pregnant state by six to eight weeks in the period beginning immediately after the birth (the postpartum period); however, it will maintain a larger shape than it previously had.

Protective function

The vagina is home to a normal population of microorganisms that help to protect against infection by pathogenic bacteria, yeast, or other organisms that can enter the vagina. In a healthy woman, the most predominant type of vaginal bacteria is from the genus Lactobacillus. This family of beneficial bacterial flora secretes lactic acid, and thus protects the vagina by maintaining an acidic pH (below 4.5). Potential pathogens are less likely to survive in these acidic conditions. Lactic acid, in combination with other vaginal secretions, makes the vagina a self-cleansing organ. However, douching or washing out the vagina with fluid can disrupt the normal balance of healthy microorganisms, and actually increase a woman’s risk for infections and irritation.

Development

The vaginal plate, a precursor to the inferior portion of the vagina, is the growth of tissue that gives rise to the formation of the vagina; it is located where the solid tips of the paramesonephric ducts (Müllerian ducts) enter the dorsal wall of the urogenital sinus as the Müllerian tubercle. The plate's growth is unrestrained, as it significantly separates the cervix and the urogenital sinus; eventually, the central cells of the plate break down to form the vaginal lumen. Until twenty to twenty-four weeks of pregnancy, the vagina is not fully canalized. If it fails to fully canalize, this may result in various forms of septae, which cause obstruction of the outflow tract later in life.
In the absence of testosterone during sexual differentiation (sex development of the differences between males and females), the urogenital sinus persists as the vestibule of the vagina, the two urogenital folds (elongated spindle-shaped structures that contribute to the formation of the urethral groove on the belly aspect of the genital tubercle) form the labia minora, and the labioscrotal swellings enlarge to form the labia majora.

Vagina develops into an elastic muscular canal that extends from the vulva to the uterus. It is reddish pink in color, and it connects the superficial vulva to the cervix of the deep uterus. The vagina is posterior to the urethra and bladder, and reaches across the perineum superiorly and posteriorly toward the cervix; at approximately a 90 degree angle, the cervix protrudes into the vagina. The vaginal orifice and urethral opening are protected by the labia.

Anatomical structure

The vagina is situated between the cervix of the uterus and the external genitalia, primarily the vulva (Pic.1). Although there is wide anatomical variation, the length of the unaroused vagina of a woman of child-bearing age is approximately 6 to 7.5 cm (2.5 to 3 in) across the anterior wall (front) and 9 cm (3.5 in) long across the posterior wall (rear).

During sexual arousal, the vagina expands in both length and width. If a woman stands upright, the vaginal tube points in an upward-backward direction and forms an angle of approximately 45 degrees with the uterus and of about 60 degrees to the horizontal. The vaginal opening and hymen also vary in size; in children, although a common appearance of the hymen is crescent-shaped, many shapes are possible (Pic.2).

The vaginal opening is at the caudal end of the vulva, behind the opening of the urethra. The upper one-fourth of the vagina is separated from the rectum by the recto-uterine pouch. Above the vagina is the mons pubis. The vagina, along with the inside of the vulva, is reddish pink in color. A series of ridges produced by the folding of the wall of the outer third of the vagina is called the vaginal rugae (Pic.3). They are transverse epithelial ridges and they provide the vagina with increased surface area for extension and stretching.

The hymen is a membrane of tissue that surrounds or partially covers the external vaginal opening. The tissue may or may not be ruptured by vaginal penetration. It can also be ruptured by delivery, a pelvic examination, injury, or sports. The absence of a hymen may not indicate prior sexual activity. Similarly, its presence may not indicate a lack of prior sexual activity.

Supporting the vagina are its upper third, middle third and lower third muscles and ligaments. The upper third are the levator ani muscles:
- transcervical
- pubocervical
- sacrocervical ligaments; these areas are also described as the cardinal ligaments laterally and uterosacral ligaments posterolaterally

The middle third of the vagina concerns the urogenital diaphragm (also described as the paracolpos and pelvic diaphragm). The lower third is the perineal body; it may be described as containing the perineal body, pelvic diaphragm and urogenital diaphragm.

**Histological structure**

The wall of the vagina from the lumen outwards consists of:

- mucosa of non-keratinized stratified squamous epithelium with an underlying lamina propria of connective tissue (Pic.4)
- layer of smooth muscle with bundles of circular fibers internal to longitudinal fibers outer
- layer of connective tissue called the adventitia

Some texts list four layers by counting the two sublayers of the mucosa (epithelium and lamina propria) separately. The lamina propria is rich in blood vessels and lymphatic channels. The muscular layer is composed of smooth muscle fibers, with an outer layer of longitudinal muscle, an inner layer of circular muscle, and oblique muscle fibers between. The outer layer, the adventitia, is a thin dense layer of connective tissue, and it blends with loose connective tissue containing blood vessels, lymphatic vessels and nerve fibers that is present between the pelvic organs.

The mucosa forms folds or rugae (Pic.5), which are more prominent in the caudal third of the vagina; they appear as transverse ridges and their function is to provide the vagina with increased surface area for extension and stretching.

Where the vaginal lumen surrounds the cervix of the uterus, it is divided into four continuous regions or vaginal fornices:

- anterior
- posterior
- right lateral
- left lateral

The posterior fornix is deeper than the anterior fornix. While the anterior and posterior walls are placed together, the lateral walls, especially their middle area, are relatively more rigid; because of this, they vagina has a H-shaped cross section. Behind, the upper one-fourth of the vagina is separated from the rectum by the recto-uterine pouch. Superficially, in front of the pubic bone, a cushion of fat called the mons pubis forms the uppermost part of the
vulva.

The epithelial covering of the cervix is continuous with the epithelial lining of the vagina. The vaginal mucosa is absent of glands. The vaginal epithelium consists of three rather arbitrary layers of cells:

- superficial flat cells - exfoliate continuously and basal cells replace them
- intermediate cells
- basal cells – estrogen induces both - the intermediate and superficial cells to fill with glycogen

Under the influence of maternal estrogen, newborn females have a thick stratified squamous epithelium for two to four weeks after birth. After that, the epithelium remains thin with only a few layers of cells without glycogen until puberty, when the epithelium thickens and glycogen containing cells are formed again, under the influence of the girl's rising estrogen levels. Finally, the epithelium thins out during menopause onward and eventually ceases to contain glycogen, because of the lack of estrogen. In abnormal circumstances, such as in pelvic organ prolapse, the vaginal epithelium may be exposed becoming dry and keratinized.

Find more about related issues

Diagnoses

**Bicornuate uterus**
Inborn morphological deviation of the uterus - one of the Müllerian duct anomalies where the uterine cavity is divided in the upper part.
Learn more at: [www.fertilitypedia.org/therapy/diag/bicornuate-uterus](http://www.fertilitypedia.org/therapy/diag/bicornuate-uterus)

**Endometrial cancer**
Cancer that arises from the endometrium, the lining of the uterus.
Learn more at: [www.fertilitypedia.org/therapy/diag/endometrial-cancer](http://www.fertilitypedia.org/therapy/diag/endometrial-cancer)

**Pyosalpinx**
A distally blocked Fallopian tube filled with pus.
Learn more at: [www.fertilitypedia.org/therapy/diag/pyosalpinx-do-rf](http://www.fertilitypedia.org/therapy/diag/pyosalpinx-do-rf)
**Uterine malformations**
A type of female genital malformation resulting from an abnormal development of the Müllerian duct(s) during embryogenesis.
Learn more at: [www.fertilitypedia.org/therapy/diag/uterine-malformations](http://www.fertilitypedia.org/therapy/diag/uterine-malformations)

**Uterus duplex**
Congenital uterine malformation where both Müllerian ducts develop but fail to fuse, thus the woman has a "double uterus".
Learn more at: [www.fertilitypedia.org/therapy/diag/uterus-duplex](http://www.fertilitypedia.org/therapy/diag/uterus-duplex)

**Uterus septus**
A form of a congenital malformation where the uterine cavity is partitioned by a longitudinal septum. It is one of Müllerian duct anomalies.
Learn more at: [www.fertilitypedia.org/therapy/diag/uterus-septus](http://www.fertilitypedia.org/therapy/diag/uterus-septus)

**Vaginismus**
A physical or psychological condition in which woman cannot engage in any form of vaginal penetration.
Learn more at: [www.fertilitypedia.org/therapy/diag/vaginismus](http://www.fertilitypedia.org/therapy/diag/vaginismus)

**Suborgans**

**Bartholin's glands**
Glands that produce a thick mucus that maintains moisture in the vulva area.
Learn more at: [www.fertilitypedia.org/edu/organs/bartholin-s-glands](http://www.fertilitypedia.org/edu/organs/bartholin-s-glands)

**Mainorgan**

**Uterus**
The uterus is the largest and major organ of the female reproductive tract that is the site of fetal growth and is hormonally responsive.
Learn more at: [www.fertilitypedia.org/edu/organs/uterus](http://www.fertilitypedia.org/edu/organs/uterus)

**Symptoms**

**Avoidance of sex**
A medical condition whose main symptom is low sexual desire.
Learn more at: [www.fertilitypedia.org/edu/symptoms/avoidance-of-sex](http://www.fertilitypedia.org/edu/symptoms/avoidance-of-sex)
Frequent and urgent urination
The need to urinate more often than usual and a sudden, compelling urge to urinate.
Learn more at: www.fertilitypedia.org/edu/symptoms/frequent-and-urgent-urination

Hypomenorrhea
Short or scanty periods with extremely light menstrual blood flow.
Learn more at: www.fertilitypedia.org/edu/symptoms/hypomenorrhea

Impossible sexual intercourse
A condition that affects a woman’s ability to engage in vaginal penetration.
Learn more at: www.fertilitypedia.org/edu/symptoms/impossible-sexual-intercourse

Infertility
The failure to achieve a clinical pregnancy after 12 months or more of regular unprotected sexual intercourse.
Learn more at: www.fertilitypedia.org/edu/symptoms/infertility

Infrequent menstruation
The medical term for infrequent, often light menstrual periods (intervals exceeding 35 days).
Learn more at: www.fertilitypedia.org/edu/symptoms/infrequent-menstruation-1

Lowered libido
The absence of sexual appetite.
Learn more at: www.fertilitypedia.org/edu/symptoms/lowered-libido

Painful sexual intercourse
The painful feelings during sexual intercourse.
Learn more at: www.fertilitypedia.org/edu/symptoms/painful-sexual-intercourse

Painful urination
A burning or stinging sensation during urination.
Learn more at: www.fertilitypedia.org/edu/symptoms/painful-urination-1

Polymenorrhea
The medical term for cycles with intervals of 21 days or fewer.
Learn more at: www.fertilitypedia.org/edu/symptoms/polymenorrhea
**Premenstrual syndrome**
A combination of physical and emotional disturbances that occur after a woman ovulates and ends with menstruation.
Learn more at: [www.fertilitypedia.org/edu/symptoms/premenstrual-syndrome](http://www.fertilitypedia.org/edu/symptoms/premenstrual-syndrome)

**Sexual frustration**
A frustration caused by a discrepancy between a person’s desired and achieved sexual activity.
Learn more at: [www.fertilitypedia.org/edu/symptoms/sexual-frustration](http://www.fertilitypedia.org/edu/symptoms/sexual-frustration)

**Vaginal discharge**
The biological fluid secreted from the vagina.
Learn more at: [www.fertilitypedia.org/edu/symptoms/vaginal-discharge](http://www.fertilitypedia.org/edu/symptoms/vaginal-discharge)

**Vaginal dryness**
Decreased or missing lubrication of vagina.
Learn more at: [www.fertilitypedia.org/edu/symptoms/vaginal-dryness](http://www.fertilitypedia.org/edu/symptoms/vaginal-dryness)

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**Gallery**

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**Pic**
*Illustration depicting female reproductive system*

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**Pic**
*External genital organs of female, the labia minora have been drawn apart.*
An illustration showing a cut-away portion of the vagina. Circular folds (also called rugae) of vaginal mucosa can be seen.

Stratified squamous epithelium and underlying connective tissue can be seen, the black line points to a fold in the mucosa.

Folds of mucosa (or vaginal rugae) providing increased surface area for extension and stretching are shown in the front third of a vagina.

Sources

“Anatomy and Physiology of the Female Reproductive System” —sourced from OpenStax College licensed under CC BY 4.0 Download for free at http://cnx.org/content/col11496/latest/