

**AN EVALUATION OF 700 CASES  
OF FEMALE INFERTILITY**

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of Master degree in Obstetrics  
and Gynecology

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W.M

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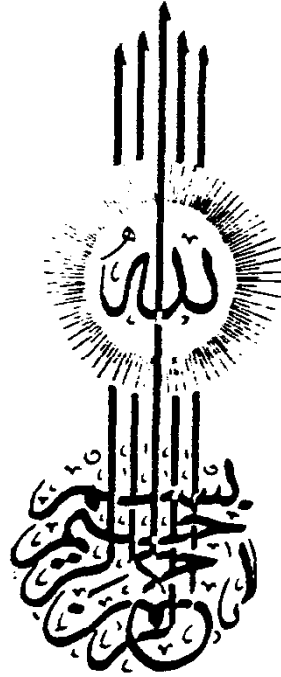
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### Anatomy and Physiology

The vagina is a fibromuscular canal which extends upward and backward from the vulva. It has anterior and posterior walls. Its anterior and posterior walls are of different length. The anterior is about 7.5 cm whereas the posterior is about 10 cm long. At its upper end the anterior wall is pierced by the cervix which projects downward and backward into the vagina. The area of the vaginal lumen which surrounds the cervix is divided for purposes of description into four regions or fornices. Anterior, posterior, right lateral and left lateral. The posterior fornix is the widest one which the semen collects in it to form what is called the seminal pool (Snell 1980).

The pH of the vagina varies with its level being highest in the upper part because of an admixture of alkaline cervical mucus. The normal vaginal pH ranges from 3.5 to 4.2 but the generally accepted figures are from 4.0 to 5.5 with an average of 4.5. During menstruation the flow of alkaline blood raises the vaginal pH to level from 5.8 to 6.8. The acidity of the vagina is of great practical importance as it explains the resistance of the adult vagina to infection,

(Jeffcoat 1976).

The uterus is a hollow, pear shaped organ with thick muscular wall. In the young nulliparous adult it measures 3 inches(8 cm) long, 2 inches (5 cm) wide and 1 inch (2.5 cm) thick. For purposes of description it is divided into the fundus, body and cervix. The fundus is the part of the uterus that lies above the entrance of the uterine tubes. The body is the part of the uterus that lies below the entrance of the tubes. It narrows below where it becomes continuous with the cervix. The cervix pierces the anterior wall of the vagina and is divided into the supravaginal and vaginal parts of the cervix, (snell 1980).

The cervix is normally oriented downward and backward in the vagina so that it is in apposition to the posterior vaginal wall. Its location allows immersion in semen deposited in the posterior vaginal fornix at ejaculation .(Michael, 1974). The mucus membrane lining the cervical canal secretes an alkaline mucus, agel rich in protein and fructose. The latter having a nutritive function for **spermatozoa**. (Jeffcoat 1976).

The human cervical mucus contains macromolecular chains that form linear fibrous structure or filaments that in turn aggregate to form micelle. (Odebland 1968).

A midcycle parallel arrangement of the micelles appears to be necessary for successful sperm transport(Davajan, 1971).

The human cervix has been shown to undergo cyclic structural changes under the influence of oestrogen and progesterone. During the proliferative phase of the cycle, there is a gradual increase in isthmus tone with progressive widening of the cervical canal and external os. At the time of ovulation, the external os is approximately three times the diameter of the postmenstrual cervical os. During the secretory phase there is progressive lengthening and narrowing of the isthmus with reduction of the width of the external os. A widely dilated external os may be observed in anovulatory patients with excessive estrogen stimulation. Cyclic changes are not noted in the prepubertal, postmenopausal or castrated female(Michael, 1974).

In the majority of women, long axis of the cervix is bent forward on the long axis of the vagina forming an angle of 90 degree. This position is referred to as anteversion of the cervix, so that its location allows immersion in semen deposited in the posterior vaginal

fornix at ejaculation. Furthermore, the long axis of the body of the uterus is bent forward at the level of the internal os with the long axis of the cervix forming an angle of about 170 degree. This position is termed ante flexion of the uterus. (Snell, 1980).

The fallopian tube is a vital structure interposed between the ovary and the uterus. Its function may be divided into two broad categories, transport of ova and spermatozoa and provision of a favourable environment for the zygote. Each uterine tube is about 4 inches (10 cm) long and it is divided into four parts; the infundibulum, ampulla, isthmus and the intramural part. The infundibulum is the funnel-shaped lateral extremity, the free edge of the funnel is broken up into a number of finger like process known as fimbria which are draped over the ovary. The ampulla is the widest part of the tube. The isthmus is the narrowest part of the tube and lies just lateral to the uterus. The intramural part is the segment that pierces the uterine wall (Snell 1980).

About half the epithelial cells, especially in the outer parts of the tube are ciliated and create a current. This combined with peristaltic action of the muscle coat, propels the ovum toward the uterus. It may also help to prevent intratubal adhesion. Most of other epithelial cells have a secretory function, they

produce being a serous fluid rich in protein which may be nutritive to the fertilised ovum. (Jeffcoat 1976). There is an increase in the rate of ciliary action at the time of ovulation, with the direction of movement toward the uterus. In management of infertility patient, anatomical abnormalities of the tubes receive concentrated diagnostic attention. Reproductive function is obviously impaired when there is bilateral Tubal adhesion and occlusion. Peritubal adhesions which distort the relationship between the ovary and the fimbria may also interfere with the mechanism of ovum pick up. (Mastroianni 1975).

The ovary is an almond shaped organ measuring  $1\frac{1}{2}$  by  $\frac{1}{2}$  inches (4 x 2 cm) and is attached to the back of the broad ligament by mesovarium. The ovary usually lies against the lateral wall of the pelvis in a depression called the ovarian fossa. The position of the ovary is, however extremely variable and it is often found hanging down in the rectouterine pouch (Pouch of Douglas). During pregnancy the enlarging uterus pulls the ovary up into the abdominal cavity. After parturition, when the Broad ligament is lax, the ovary takes up a variable position in the pelvis (Snell 1980).

The ovary has evolved into a complex organ in which germ cells may be maintained for prolonged periods in a semi-differentiated state, and which also periodically prepares the reproductive tract for the reception and nurture of the zygote. The later function is performed by hormones produced by somatic cells in the ovary. The co-ordination of all these processes reaching full expression at the beginning of reproductive life and is accomplished through the activity of the pituitary gland and Hypothalamus. The development of physiological feed back between this neuro-endocrine complex and the ovaries is essential to the establishment of characteristic cyclical reproductive phenomena in the female. Many structural and functional abnormalities which subsequently affect fertility in an individual may well stem from disturbances in the delicate balance between germ cells and ovarian somatic cells during embryonic and early fetal life, as well as from a failure to establish the hypothalamic-pituitary-gonad axis at the appropriate time. (Franchi 1973).

#### Physiology of Conception

On about day 14 of an average menstrual cycle the women ovulates. The egg is released from the ovary into the body cavity. Typically it is then picked up

by the fimbriae and enters the fallopian tube. It then begins a leisurely trip down the tube toward the uterus, reaching it in about five days, if it has been fertilized. Otherwise, it disintegrates in about 48 hours. The egg unlike the sperm, has no means of moving itself and is propelled by the cilia lining the Tube. The egg has begun its part of the journey toward conception. Meanwhile, the woman has been having intercourse. The man has an orgasm and ejaculates inside the woman's vagina. The sperm are deposited in the vagina, there to begin their journey toward the egg. Actually they have made an incredible trip even before reaching the vagina. Initially they were manufactured in the seminiferous tubules of the testes. They then collected and were stored in the epididymis. During ejaculation they moved up and over the top of the bladder in the vas deferens; then they traveled down through the ejaculatory duct, mixed with seminal fluid, and went out through urethra. The sperm is one of the tiniest cells in the human body. A typical ejaculate has a volume of about 3 milliliters, or about a teaspoonful, and contains about 300 million sperm. While this might seem to be a wasteful amount of sperm if only one is needed for fertilization, the great majority of the sperm never

get even close to the egg. Some of the ejaculate together with the sperm in it, may flow out of the vagina as a result of gravity. Other sperm may be Killed by the acidity of the vagina, to which they are very sensitive. Of those that make it safely into the uterus, half swim up the wrong fallopian Tube (The one containing no egg). Sperm are capable of swimming 1 to 3 centimeters (about 1 inch) per hour, although it has been documented that sperm may arrive at the egg within 1 to 1½ hours after ejaculation, which is much sooner than would be expected, given their swimming rate. It is thought that muscular contraction in the uterus may help speed them along. By the time a sperm reaches the egg, it has swum approximately 3000 times its own length (This would be comparable to a swim of over 3 miles for a human being). Contrary to the popular belief that conception occurs in the uterus, typically it occurs in the outer third (The part near the ovary) of the fallopian Tube. While the exact mechanism that permits one and only one sperm to enter the egg is unknown, it is thought that the sperm swarm around the egg and secrete an enzyme called hyaluronidase, this enzyme dissolves the zona pellucida permitting one sperm to penetrate the egg. The fertilized egg, called the

zygote continues to travel down the fallopian Tube. About 36 hours after conception, it begins the process of cell division, by which the original one cell becomes a mass of two cells, then four cells, then eight cells and soon. About 5 to 7 days after conception, the mass of cells implants itself in the lining of the uterus, there to be nourished and grow. For the first eight weeks of gestation the conceptus called an embryo, from then until birth it is called a fetus. (Janet 1982).

## Infertility and sterility

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It has been estimated that 10 to 15 percent of all married couples are infertile. Proper management of the infertile couples is now of utmost importance. The diagnosis of infertility is made when conception does not occur after one year of sexual exposure in a couple trying to achieve a pregnancy. The term "primary infertility" means that the couple have never achieved a pregnancy in contrast to "secondary infertility" which implies that at least one previous conception has taken place. The term sterility should be used only if there is no therapy available to correct the defect "for example, gonadal dysgenesis, congenital absence of the uterus". "Val Davajan 1979".

Numerous studies have indicated that approximately 25% of women become pregnant within 1 month of unprotected intercourse, 63% within 6 months, 75% within 9 months, 80-90% within a year and only one additional 5% after an additional 6 months of exposure. These figures are relatively consistent around the world, although Macleod's data from 1953 indicate that increased coital frequency increases the incidence of pregnancy of couples having intercourse less than one