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DEPARTMENT: NURSING SCIENCE

COURSE TITLE: PHYSIOLOGY

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ASSIGNMEMT TITLE: FERTILISATION

QUESTION

Write a short note on IMPLANTATION

Implantation is a process in which a developing embryo, moving as a blastocyst through a uterus, makes contact with the uterine wall. It implants (fixes itself or gets attached) to the endometrial lining of uterus.

The zygote takes about 3 to 5 days to reach the uterine cavity from within the fallopian tube, during which it undergoes several rounds of cell division, a process called cleavage. As cleavage proceeds the ovum comes to have 16 cells, i.e. fourth division. It now looks like a mulberry and is called the morula. These cell divisions produce the inner cell mass, which will become the embryo (what later develops into a baby), and the trophoblast, which surrounds the inner cell mass and interacts with maternal tissues. The trophoblast contributes to the placenta while nourishing and protecting the embryo. Together, the inner cell mass and the trophoblast are called the blastocyst.

During the stay in uterine cavity before implantation, the zygote receives its nutrition from the secretions of endometrium, which is known as uterine milk. Implantation of the blastocyst to the uterine wall begins within 6 to 8 days after fertilization and requires proper priming of the uterus by estrogen and progesterone. If the zygote implants in any area besides the uterus, the result is an ectopic pregnancy.

Erosion of the uterine endometrium occurs due to the proteolytic enzymes secreted by both polar trophoblast and uterine epithelium. The blastocyst burrows deeper and deeper into the uterine mucosa till the whole of it comes to lie within the thickness of the endometrium. While preparing for implantation, the blastocyst escapes from the zona pellucida. The zona pellucida is ruptured by expansion of the blastocyst and lysed by enzymes. The denuded trophoblast cells

become negatively charged and adhere to the endometrium via surface glycoproteins. Microvilli from the trophoblast cells interdigitate with, and form, junctional complexes with the uterine endometrial cells. Thus, it takes about 1 week for implantation after the day of fertilization. In the presence of progesterone emanating from the corpus luteum, the endometrium undergoes decidualization, which involves the hypertrophy of endometrial cells that contain large amounts of glycogen and lipid. In some cases, the cells are multinucleated. This group of decidualized cells is called the decidua, which is the site of implantation and the maternal contribution to the placenta. In the absence of progesterone, decidualization does not occur and implantation fails.
As the blastocyst implants into the decidualizing uterus, a decidual reaction occurs, involving the dilation of blood vessels, increased capillary permeability, edema formation, and increased proliferation of endometrial glandular and epithelial cells. Many of the signals that mediate the interaction of the blastocyst with the endometrium have been identified and include steroids, prostaglandins, leukemia inhibitory factor, epidermal growth factor, transforming growth factor b, platelet-derived growth factor, and placental growth factor.

Clinical correlation
Ectopic pregnancy: This results from abnormal sites of implantation, i.e. extrauterine pregnancies. Ectopic pregnancies do not progress and usually result in death of the embryo. Rarely does this embryo develop to full term

Placenta previa
The normal attachment of placenta is in the upper uterine segment. The attachment of placenta may extend partially or completely into the lower uterine segment. This condition is called placenta previa. This is due to the implantation of the blastocyst close to the opening into the uterus.

Indications of implantation

- **Bleeding**

In the first trimester of pregnancy most women experience bleeding or spotting and implantation is one cause of first trimester bleeding. The difference between the first trimester bleeding and

menstruation is that implantation bleeding is most likely to be light pink or brown as opposed to the usual bright or dark red of menstrual flow

Implantation bleeding is more like spotting than an actual flow of blood This spotting may occur once, or last for a few hours, or even up to three days. Brown discharge may be noticed when you wipe or on your underwear, but full pad or tampon won't be needed, possibly not for many months.

- **Cramps**

Changing hormonal tide can cause cramping. Furthermore, there's a lot going on in the uterus as the fertilized egg implants and begins to grow.

While there is no research indicating that implantation itself causes cramps, some women do feel abdominal tenderness, lower back pain, or cramping around the time of implantation. This may seem like a mild version of menstrual cramps.

- **Discharge**

During ovulation, the cervical mucus will be clear, stretchy, and slippery. After implantation occurs, the mucus might have a thicker, "gummier" texture and be clear or white in color. And in the days of early pregnancy, rising progesterone and estrogen may cause the mucus to become even thicker, more profuse, and white or yellow in color.

Cervical mucus can be affected by a number of things (hormones, stress, intercourse, pregnancy, implantation bleeding or menstrual period) and may not be a reliable indicator of whether or not implantation has occurred.

- **Bloating**

Rising progesterone slows the digestive system down. This can make one feel bloated. This feeling can be a really common symptom of menstruation too.

- **Tender breasts**

After implantation, levels of hCG, estrogen, and progesterone all increase rapidly. This can cause the breasts to feel very sore. While many women experience breast swelling or tenderness before their periods, this is likely to be more noticeable than usual in very early pregnancy.

- **Nausea**

Increased levels of progesterone following implantation can make one feel nauseous. This most commonly occurs around 4 or 5 weeks of pregnancy.

Progesterone slows down digestion, which can contribute to nausea. Rising hCG levels and a more sensitive sense of smell can make the problem worse.

- **Headaches**

While they're good and necessary for a successful pregnancy, those wildly rising hormone levels (particularly progesterone) can also give headaches following implantation.

- **Mood swings**

Estrogen and progesterone, as well as hCG, increase very quickly following implantation. This can make you feel "off" or moodier than usual.

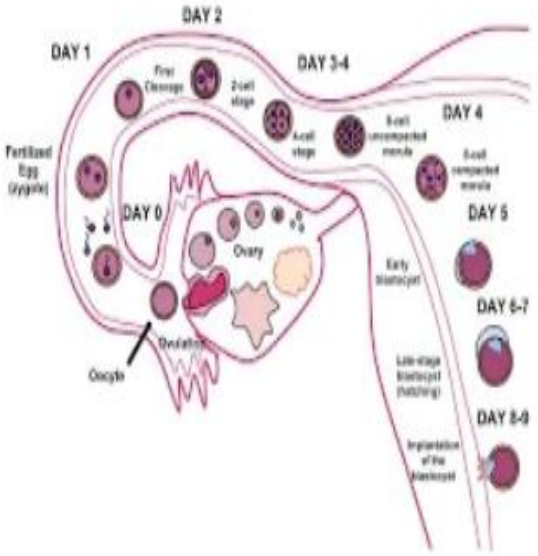
- **Implantation dip**

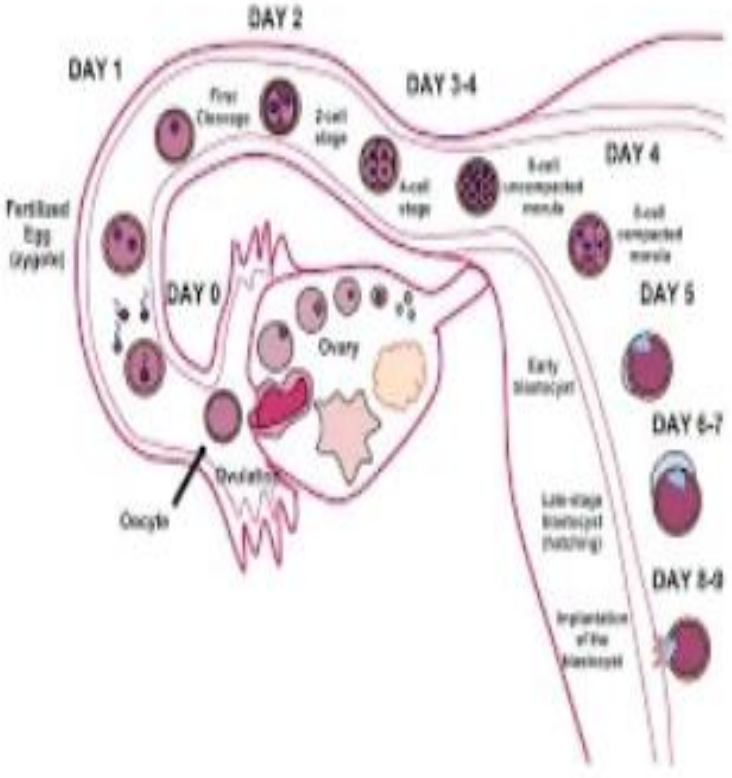
Implantation dip refers to a one-day decrease in the basal body temperature that can occur as a result of implantation.

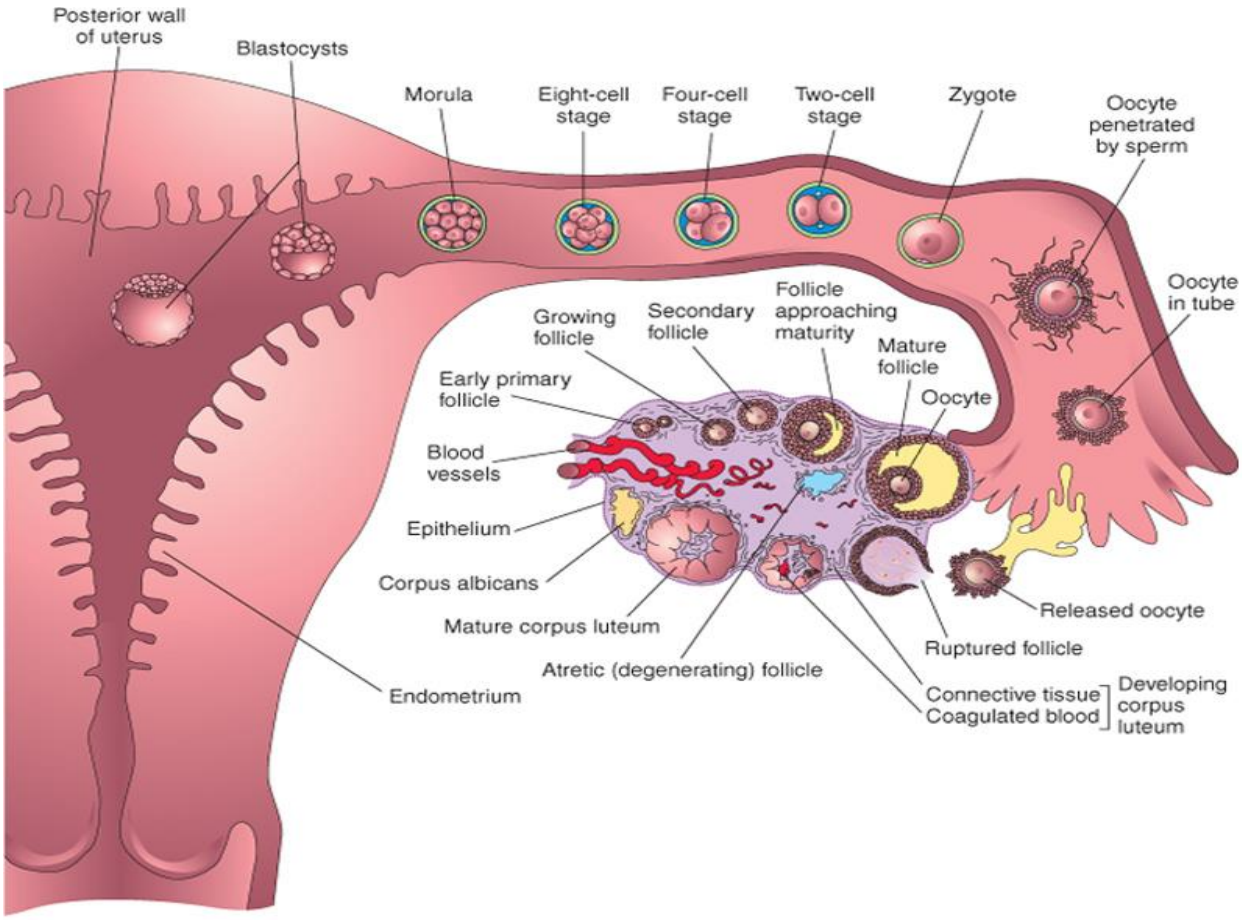
Basically, a woman's temperature is lower before ovulation, and then increases, and then drops again before her period starts. If you get pregnant, your temperature remains elevated.

Some women seem to experience a one-day drop in temperature around the time of implantation. when one is about to start menstruation the temperature drops that in the case of an imminent period, your temperature would stay low.

In the case of implantation dip, the temperature drops for one day and then goes back up. It's thought that this might be due to a rise in estrogen.




DAY 2
DAY 1
DAY 3-4
DAY 4
DAY 0
DAY 5
DAY 6-7
DAY 8-9
Ovary
Oocyte
Early blastocyst


Posterior wall of uterus
Blastocysts
Morula
Eight-cell stage
Four-cell stage
Two-cell stage
Zygote
Oocyte penetrated by sperm
Oocyte in tube
Growing follicle
Secondary follicle
Follicle approaching maturity
Mature follicle
Oocyte
Early primary follicle
Blood vessels
Epithelium
Corpus albicans
Mature corpus luteum
Atretic (degenerating) follicle
Endometrium
Released oocyte
Ruptured follicle
Connective tissue
Coagulated blood
Developing corpus luteum