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18/MHS01/086

MEDICINE AND SURGERY

200 LEVEL

EMBRYOLOGY

THE SECOND WEEK OF EMBRYONIC DEVELOPMENT

The following events take place during the second week of embryonic development

- I. Completion of implantation of the blastocysts
- II. Formation of bilaminar embryonic disc (hypoblast and epiblast)
- III. Formation of extraembryonic structures; amniotic cavity, amnion, umbilical vesicle (yolk sac), connecting stalk and chorionic sac.

Day 8

- The blastocysts are partially embedded in the endometrium.
- The syncytiotrophoblast continues to invade the endometrium.
- The cells in the cytotrophoblast divide and migrate into the syncytiotrophoblast
- The inner cell mass differentiates into two layers;
 - Hypoblast layer (cuboidal cells)
 - Epiblast layer (high columnar cells)
- Hypoblast and Epiblast layer together form a flat ovoid shaped disc called the bilaminar germ/embryonic disc
- A small space (cavity) appears within the epiblast to form the amniotic cavity

Day 9

- Blastocysts are more deeply embedded in the endometrium
- Penetration defect in the surface epithelium is closed by a coagulum called fibrin
- Vacuoles appear at the region of the trophoblast and they fuse to form larger trophoblastic lacunae
- The cells of the hypoblast adjacent to the cytotrophoblast form a thin membrane called the exocoelomic (Heuser's) membrane
- The exocoelomic membrane and the hypoblast form the lining of the exocoelomic cavity or primary yolk sac or primary umbilical vesicle

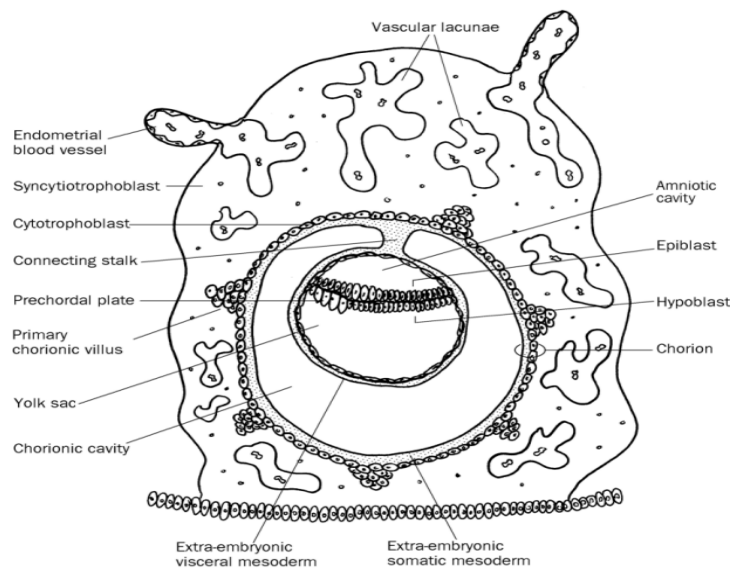
Day 11-12

- Blastocyst is completely embedded in the endometrium, blastocyst now produces a slight protrusion into the lumen of the uterus
- The syncytiotrophoblast penetrates deeper into the stroma (tissue) and erodes the endothelial lining of the endometrial capillaries, ruptured capillaries are called sinusoids
- The trophoblastic lacunae begins to communicate with the sinusoids to establish the primordial uteroplacental circulation

- The maternal blood flows into the lacunae bringing in oxygen and nutrients to the embryo
- A new population of cells appear between the cytotrophoblast and exocoelomic cavity, they form a fine, loose connective tissue called extraembryonic mesoderm
- Soon large cavities develop in the extraembryonic mesoderm and when they become confluent, they are called extraembryonic cavity/coelom
- The extraembryonic mesoderm that lines the cytotrophoblast and amnion is called extraembryonic somatic mesoderm
- The extraembryonic mesoderm that lines the exocoelomic cavity is the extraembryonic splanchnic mesoderm

Day 13

- The surface defect in the endometrium has been completely covered up by the surface epithelium
- Cells of the cytotrophoblast proliferate locally and penetrate into the syncytiotrophoblast forming cellular columns covered by syncytium called primary villi
- The primary yolk sac reduces in size to form the secondary yolk sac or secondary umbilical vesicle
- During the formation of the secondary yolk sac, large portions of the exocoelomic cavity are pinched off to form exocoelomic cysts
- The extraembryonic coelom expand to form chorionic cavity
- The extraembryonic mesoderm lining the cytotrophoblast is called chorionic plate
- The connecting stalk develops into the umbilical cord with development of blood vessels



Clinical Correlates

The syncytiotrophoblast produces a hormone called human chorionic gonadotropin (hCG). The human chorionic gonadotropin

- Keeps the corpus luteum secreting estrogen and progesterone
- Maintains the hormonal activity of the corpus luteum in the ovary during pregnancy