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DEPARTMENT: MEDICINE AND SURGERY

COLLEGE: MEDICINE AND HEALTH SCIENCES

COURSE TITLE: EMBRYOLOGY

DISCUSS THE SECOND WEEK OF DEVELOPMENT.

During the second week of development the following events take place:

- Completion of implantation of the blastocyst.
- Formation of bilaminar embryonic disc.
- Formation of extraembryonic structures.

Day 8

At the eighth day of development, the blastocyst is partially embedded in the endometrium the syncytiotrophoblast continues to invade the endometrium, thus eroding endometrial blood vessels and its glands. As this continues more cells in the cytotrophoblast divide and migrate into the syncytiotrophoblast. Cells of the embryoblast differentiate into 2 layers:

- i. the hypoblast layer which is made up of cuboidal cells, and it is adjacent to the blastocyst cavity.
 - ii. the epiblast layer which is made up of columnar cells, and it adjacent to the amniotic cavity.
- The hypoblast and epiblast layer join to form a the bilaminar embryonic disc which is flat and void shaped. At the same time, a small cavity appears within the epiblast called the amniotic cavity. Epiblast cells adjacent to the cytotrophoblast are called amnioblasts. Amnioblasts together with the rest of the epiblast, line the amniotic cavity.

Day 9

The blastocyst is deeply embedded in the endometrium and because of this the surface epithelium is closed by a coagulum called fibrin. Vacuoles appear at the region of the syncytiotrophoblast and they fuse to form trophoblastic lacunae. This phase of trophoblast development is known as the lacunar stage. Exocoelomic (Heuser's) membrane is a thin membrane formed from the cells of the hypoblast adjacent to the cytotrophoblast. Heuser's membrane lines the inner surface of the cytotrophoblast. Exocoelomic cavity or primitive yolk sac or primary umbilical vesicle is the cavity between the Heuser's membrane and the hypoblast.

Day 11-12

The blastocyst is completely embedded in the endometrium, and the surface epithelium almost entirely covers the defect in the uterine wall. The blastocyst now completely embedded begins to rupture the endometrial capillaries. These ruptured endometrial capillaries are called sinusoids. The trophoblastic lacunae then begin to communicate with the sinusoids, and maternal blood enters the lacunar system. When maternal blood flows into the lacunae, oxygen and nutritive substances are available to the embryo a new population of cells appears between the inner surface of the cytotrophoblast and the outer surface of the exocoelomic cavity. These cells which are derived from yolk sac cells form the extraembryonic mesoderm. Soon, large cavities develop in the extraembryonic mesoderm, and merge to form a new space called the extraembryonic cavity or extraembryonic coelom. This space surrounds the primitive yolk sac and amniotic cavity, except where the germ disc is connected to the trophoblast by the connecting stalk. The extraembryonic mesoderm lining the cytotrophoblast and amnion is called the extraembryonic somatic mesoderm. This also forms the connecting stalk. The lining covering the yolk sac is known as the extraembryonic splanchnic mesoderm. As the conceptus implants, the endometrial connective tissue cells undergo a transformation called decidual reaction. During decidual reaction, the cells of the endometrium swell because of the accumulation of glycogen and lipid in their cytoplasm, and they are known as decidual cells.

Day 13

Here the surface defect in the endometrium has been completely covered by the surface epithelium. Occasionally bleeding occurs at the implantation site as a result of increased blood flow into the lacunar spaces. Cells of the cytotrophoblast proliferate and penetrate into the syncytiotrophoblast, forming cellular columns with syncytial covering known as primary villi surrounded by syncytium. The primary yolk sac becomes reduced in size and is known as the secondary yolk sac or secondary umbilical vesicle. In humans the yolk sac contains no yolk but is important for the transfer of nutrients between the fetus and mother. This yolk sac is much smaller than the primitive yolk sac. During its formation, large portions of the exocoelomic cavity are removed to form exocoelomic cysts. Exocoelomic cysts are often found in the extraembryonic cavity or chorionic cavity or extraembryonic coelom. Meanwhile, the extraembryonic coelom expands and forms a large cavity called the chorionic cavity. The extraembryonic mesoderm lining the inside of the cytotrophoblast is then known as the chorionic plate. With development of blood vessels, the connecting stalk becomes the umbilical cord.

