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18/MHS01/232

MBBS

MHS

ANATOMY- EMBRYOLOGY

2ND WEEK (day 8-13) OF EMBRYOLOGICAL DEVELOPMENT

The second week of embryological development is concerned with the process of implantation and the differentiation of blastocyst into early embryonic and placental forming structures.

Three major event occur;

1. Completion of Implantation.
2. Formation of Bilaminar Germ Disc
3. Development of Extra embryonic Structures

Day 8

Completion of the implantation of the blastocyst takes place on day 8. The blastocyst is partially embedded in the endometrium and the syncytiotrophoblast continues to erode the endometrium to invade it thereby eroding the endometrial blood vessels and endometrial gland. The cytotrophoblast cells then continue to divide and migrate into the region of the syncytiotrophoblast. The inner cell mass forms an inner layer of larger cells which is called the embryoblast, a cluster of cells located and attached on one of the syncytiotrophoblast. This mass then differentiates into distinct layers of cell; the cuboidal cells called the hypoblast and the columnar cells called the epiblast. The cells of the epiblast adjacent to the cytotrophoblast are called the amnion or amnioblast. The epiblast and amnioblast surround a cavity called the Amniotic Cavity and they both give rise to the Bilaminar Germ Disc. The endometrium adjacent to the implantation site is edematous and highly vascular. The amniotic cavity is filled with amniotic fluid.

Day 9

During this time, the blastocyst is completely embedded in the endometrium and the surface epithelium is closed from the penetration defect by a coagulum called fibrin. A larger lacunae called trophoblastic lacunae is then formed from fusion of the vacuoles found in the syncytiotrophoblast, this phase is called the Lacunae Phase. The cells of the hypoblast adjacent to the cytotrophoblast forms a thin membrane called the Exocoelomic (Heuser’s) membrane and this membrane lies in the inner surface of the cytotrophoblast. Together with the hypoblast, the exocoelomic (Heuser’s) membrane forms the lining of the Exocoelomic Cavity or Primitive Yolk Sac or Primary Umbilical Vesicle.

Day 11-12

From this day (approx.), the blastocyst is completely embedded in the endometrium and the surface endometrium almost entirely covers the original defect in the uterine wall. Now the blastocyst produces a small protrusion into the lumen of the uterus and as the syncytiotrophoblast cells continue to erode the endometrium, the blood vessels are ruptured. This ruptured blood vessels are called Sinusoids. The maternal sinusoid then communicates with the trophoblastic lacunae of the blastocyst to establish the Primordial Uroplacental Circulation which transmits blood carrying oxygen and nutritive substances.

Furthermore, a space of mesoderm develops between the exocoelomic membrane and cytotrophoblast containing a new population of cells. These cells form a fine, loose connective tissue called Extraembryonic Mesoderm. Within the extraembyonic mesoderm, large cavities begin to develop called Extraembryonic Cavity, Chorionic Cavity or Extraembryonic Coelom. This cavity surrounds the primitive yolk and amniotic cavity except where the germ disc is connected to the connecting stalk. This cavity divides the extraembryonic mesoderm into two different parts. The part of the extraembryonic mesoderm that lies adjacent to the region of the cytiotrophoblast and amnioblast called the Extraembryonic Somatic Mesoderm, it forms the connecting stalk. The second part is the lining covering the yolk sac known as the Extraembryonic Sphlanic Mesoderm.

As the conceptus implants, the endometrial connective tissue cells undergo a transformation called Decidual Reaction. During this transformation, the cells of the endometrium swell because of accumulation of glycogen and lipid in their cytoplasm and they are known as Decidual Cells. The primary function of the decidual cell is to provide nutrition for early embryo and immunologically privileged site for the conceptus.

Day 13

The cytotrophoblast acquire syncytium and form primary villi in the region syncytiotrophoblast. The connecting stalk forms the umbilical cord. The extraembryonic coelom becomes enlarged and gives rise to the Chorionic Cavity. The exocoelomic caity then becomes smaller and forms secondary yolk sac. A small part is then pinched off to form a cyst called Exocoelomic Cyst.