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200 LEVEL, MBBS.

Embryology assignment.

QUESTION: Discuss the 2nd week of development.

ANSWER: 3 events take place during the second week of development namely;

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

ON THE 8TH DAY:

- The blastocyst is partially embedded in the endometrium.
- The syncytiotrophoblast continues to erode the endometrium, also eroding endometrial blood vessels and glands.
- Cells in the cytotrophoblast divide and migrate into the region of the syncytiotrophoblast, fusing and losing their individual cell membranes.
- Cells of the embryoblast differentiate into 2 layers:
 - A. The hypoblast layer: this is made up of small cuboidal cells and is nearer to the blastocyst cavity.
 - B. The epiblast layer: this is made up of high columnar cells and is nearer to the amniotic cavity.
- Cells of the epiblast near to the cytotrophoblast is called the *amnioblast*.
- Amnioblasts surround a cavity called the amniotic cavity, forming cells of the amniom.
- The hypoblast and epiblast layers together form the bilaminar germ disc.
- The endometrium adjacent to the implantation site is highly vascular and edematous.

ON THE 9TH DAY:

- The syncytiotrophoblast continues to erode the endometrium including its blood vessels.
- The cells of the cytotrophoblast will continue to divide and migrate into the region of the syncytiotrophoblast.
- The blastocyst is deeply embedded in the endometrium.
- The surface epithelium is closed by fibrin coagulum.
- As development continues, a membrane lies adjacent to the region of the cytotrophoblast and is called the *exocoelomic membrane*.
- A cavity is between the exocoelomic membrane and the hypoblast is referred to as the *exocoelomic cavity/primary yolk sac*.

- Vacuoles develop in the region of the syncytiotrophoblast and enlarges to form the trophoblastic lacunae.

ON THE 10TH-12TH DAY:

- The blastocyst is completely embedded in the endometrium, and the surface epithelium almost entirely covers the original defect in the uterine wall.
- The syncytiotrophoblast continues to erode the endometrium, rupturing capillaries and blood vessels.
- The rupturing capillaries are referred to as *sinusoids*.
- The blastocyst slightly protrudes into the lumen of the uterus.
- The trophoblastic lacunae then begin to communicate with the sinusoids and at this point, a primordial uteroplacental circulation is established.
- A new population of cells appears between the inner surface of the cytotrophoblast and the outer surface of the exocoelomic cavity.
- These cells are derived from the yolk sac and form a fine, loose connective tissue called the *extraembryonic mesoderm*.
- Large cavities develop in the extraembryonic mesoderm, subsequently a new space known as the *extraembryonic cavity* is formed.
- This space surrounds the primitive yolk sac and amniotic cavity, except where the germ disc is connected to the trophoblast via the connecting stalk.
- The extraembryonic mesoderm lining the cytotrophoblast and the amnion is called the *extraembryonic somatic mesoderm*.
- The extraembryonic somatic mesoderm forms the connecting stalk.
- The lining covering the yolk sac is known as the extraembryonic splanchnic mesoderm.
- During implantation of the conceptus, the endometrial connective tissue cells undergo decidual reaction.
- During this, the cells of the endometrium swell because of the accumulation of glycogen and lipid in their cytoplasm, and then they are known as *decidual cells*.
- The decidual reaction provides nutrition for the early embryo and an immunologically privileged site for the conceptus.

ON THE 13TH DAY:

- The surface defect in the endometrium is completely covered by the surface epithelium.
- Cells of the cytotrophoblast proliferate locally and penetrate into the syncytiotrophoblast, forming cellular columns surrounded by the syncytium.
- Cellular columns with the syncytial covering are known as *primary villi*.
- The primary yolk sac becomes reduced in size and is known as the secondary yolk sac.
- This yolk sac is much smaller than the original exocoelomic cavity
- In humans, the yolk sac does not contain yolk but is important for the transfer of nutrients between the fetus and the mother.
- During the formation of the yolk sac, large portions of the exocoelomic cavity are pinched off to form exocoelomic cysts.
- These cysts are often found in the extraembryonic cavity.

- In the meantime, the extraembryonic coelom enlarges and forms the chorionic cavity.
- The extraembryonic mesoderm lining the inside of the cytotrophoblast is then known as the *chorionic plate*.
- The place where extraembryonic mesoderm transverses the chorionic cavity is in the connecting stalk.
- With development of blood vessels, the connecting stalk becomes the umbilical cord.