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COLLEGE: MEDICINE AND HEALTH SCIENCES.

COURSE TITLE: EMBRYOLOGY I.

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DATE: 1SH MAY, 2020.

ASSIGNMENT QUESTION

Discuss 2nd week of embryonic development

2ND WEEK OF EMBRYONIC DEVELOPMENT

Implantation which started the first week of embryonic development continues in the second week. As implantation of the blastocyst occur, morphological changes in the embryoblast produce a bilaminar embryonic disc composed of epiblast and hypoblast. The embryonic disc gives rise to the germ layers that form all tissues and organs of the embryo. Extra-embryonic structures forming during the second week are amniotic cavity, amnion, umbilical vesicle connecting stalk and chorionic sac.

The following are the main events taking place in specific important days;

- Completion of implantation
- Formation of bilaminar germ disc
- Development of extra embryonic structures

DAY 8

- ✓ The blastocyst is embedded in the endometrium
- ✓ The syncytiotrophoblast continue to erode the endometrium
- ✓ The cells of the cytotrophoblast divide and migrate into the region of syncytiotrophoblast
- ✓ Embryoblast divide into two; a cuboidal hypoblast and a columnar epiblast.
- ✓ Cells of epiblast adjacent to the cytotrophoblast are called amnioblast.
- ✓ The hypoblast and epiblast layers together form a flat ovoid shaped disc called the bilaminar embryonic disc.

DAY 9

- ✓ The blastocyst is deeply embedded in the endometrium
- ✓ As the blastocyst gets embedded, the surface epithelium is closed by a coagulum 'fibrin'.
- ✓ Exocoelomic membrane as known as Heuser's membrane develops from the cells of the hypoblast adjacent to the cytotrophoblast.
- ✓ The exocoelomic (Heuser's) membrane together with the hypoblast forms the lining of the exocoelomic cavity, or primitive yolk sac or primary umbilical vesicle
- ✓ Vacuoles develops into the region of the syncytiotrophoblast and they are called trophoblastic lacuna

DAY 11-12

- ✓ The blastocyst is completely embedded in the endometrium
- ✓ The syncytiotrophoblast continue to erode the endometrium
- ✓ The cells of cytotrophoblast divide and migrate into the region of syncytiotrophoblast.
- ✓ The blood vessels continue to rupture as the blastocyst enters. They are called sinusoids.
- ✓ Ruptured sinusoids communicates with the trophoblastic lacunae and transfers nutrients etc through blood. A primordial utero-placental 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 which are derived from yolk sac cells form a fine, loose connective tissue called the extraembryonic mesoderm
- ✓ Soon, large cavities develop in the extraembryonic mesoderm, and when these become confluent, they form a new space known as the extraembryonic cavity, or chorionic cavity or extraembryonic coelom.
- ✓ The extraembryonic mesoderm lining the cytotrophoblast and amnion is called the extra-embryonic somatic mesoderm also forms the connecting stalk.
- ✓ The lining covering the yolk sac is known as the extraembryonic splanchnic mesoderm
- ✓ The endometrial connective tissue cells undergo decidua reaction.
- ✓ During the reaction, the endometrium swells because of the accumulation of glycogen and lipids in their cytoplasm and they are known as decidua cells. **The primary function of decidua reaction is to provide nutrition for the early embryo and an immunologically privileged site for the conceptus.**

DAY 13

- ✓ The blastocyst is already inside the endometrium
- ✓ Cells of the cytotrophoblast proliferate locally and penetrate into the syncytiotrophoblast, forming cellular columns surrounded by syncytium
- ✓ Bleeding occurs sometimes at the implantation site as a result of increased blood flow into the lacunar spaces

- ✓ The primary yolk sac becomes reduced in size and is known as the secondary yolk sac. This new cavity is known as the secondary yolk sac or definitive yolk sac or the secondary umbilical vesicle.
- ✓ The extraembryonic coelom expands and forms a large cavity called the chorionic cavity and the extraembryonic mesoderm lining the inside of the cytotrophoblast is then known as the chorionic plate.
- ✓ The only place where extra-embryonic mesoderm travers as the chorionic cavity is in the connecting stalk which later becomes the umbilical cord of the embryo.
- ✓ A portion of the primary yolk sac is pinched off to form exocoelomic cyst.

CLINICAL CORRELATES

1. Ectopic pregnancies are caused by implantation of blastocysts outside the uterus. These implantations result in 95% to 98% of ectopic pregnancies which occur in the uterine tubes, most often in the ampulla and isthmus.
2. The syncytiotrophoblast produces a hormone called the human chorionic gonadotrophin (hCG), which is used to determine if a woman is pregnant through a simple pregnancy test kit. This hCG hormone can be detected in maternal blood or urine as early as **day 10** of pregnancy as enough hCG is produced by the syncytiotrophoblast at the end of the second week to give a positive pregnancy test.
3. Spontaneous abortions occur within the first 12 completed weeks of pregnancy but most spontaneous abortions of embryo occurs in the first 3 weeks.