

19/11/2023

Anatomy 2002

Systemic Embryology | AKA 206

Development of lungs and stomach

Development of the lungs

Formation of the lung buds start at the 4th week of gestation. The respiratory diverticulum (lung bud) appears as an outgrowth from the ventral foregut. Retinoic acid from surrounding mesoderm is the initiating factor.

As it causes up-regulation of transcription factor $TFEB$. The epithelium of the lung is derived from foregut.

The connective tissue, muscle and cartilage is from splanchnic mesoderm. Parietal pleura is from somatic mesoderm, and visceral pleura is from splanchnic mesoderm. Tracheoesophageal ridges separate the lung bud from the foregut, and fuse to form a tracheoesophageal septum. Lung buds form bronchial buds which form into the right and left main bronchi.

Growth is caudal and lateral to fill the pericardioperitoneal canals. 10 tertiary bronchi (segmental) are developed on the right and 8 in the left. These correspond to the bronchopulmonary segment in an adult lung.

Terminal bronchioles divide to form respiratory bronchioles and these divide into alveolar ducts. The terminal sacs are initially cuboidal epithelium but the distal portion becomes squamous as the vascular supply grows in it. These are the type I alveoli and type II produce surfactant.

2. Rotation of the stomach and formation of the omental bursa
During development the stomach rotates 90° in a clockwise direction along its longitudinal axis. The rotation results in the right side of the stomach becoming posteriorly oriented and the left side of the stomach facing anteriorly. During this rotation, one side of the stomach grows faster than the other forming the greater and lesser curvatures of the stomach.

In the second rotation, the stomach subsequently rotates on its longitudinal axis, causing the pylorus to shift to the right and the cardiac orifice to shift to the left.

During rotation, the cranial end moves to the left and slightly downward. The caudal end moves to the right and upward. After rotation, the stomach assumes its final position with its long axis rising from oblique left to oblique right.

The Omental Bursa formation

The omental bursa or lesser sac is a hollow space that is formed by the greater and lesser omentum and its adjacent organs. It communicates with the greater sac via the epiploic foramen of Winslow, which is known as the posterior foramen of the abdomen that sits within the peritoneum but outside the lesser sac. This space has well-defined borders which are represented by certain organs or their parts, so they are quite easy to split and form a mental image of the omental bursa. The omental bursa does not just exist as a standalone and isolated entity, but rather it communicates with several other spaces and recesses found throughout the body.

The esophagus develops from the endodermal primitive gut tube. The ventral part of the embryo abuts the yolk sac. During the second week of embryological development, as the embryo grows, it begins to surround parts of the sac. The enveloped portions form the basis for the gastrointestinal tract.

The sac is surrounded by a network of vitelline arteries. Over time, these arteries consolidate into the three main arteries that supply the developing gastrointestinal tract: the celiac artery, superior mesenteric artery, and inferior mesenteric artery. The area supplied by these arteries grows up to define the midgut, hindgut and foregut.

The surrounded sac becomes the primitive gut. Sections of this gut begin to differentiate into the organs of the gastrointestinal tract, such as the esophagus, stomach and intestines. The esophagus develops as part of the foregut tube. The lining of the esophagus develops from the pharyngeal arches.