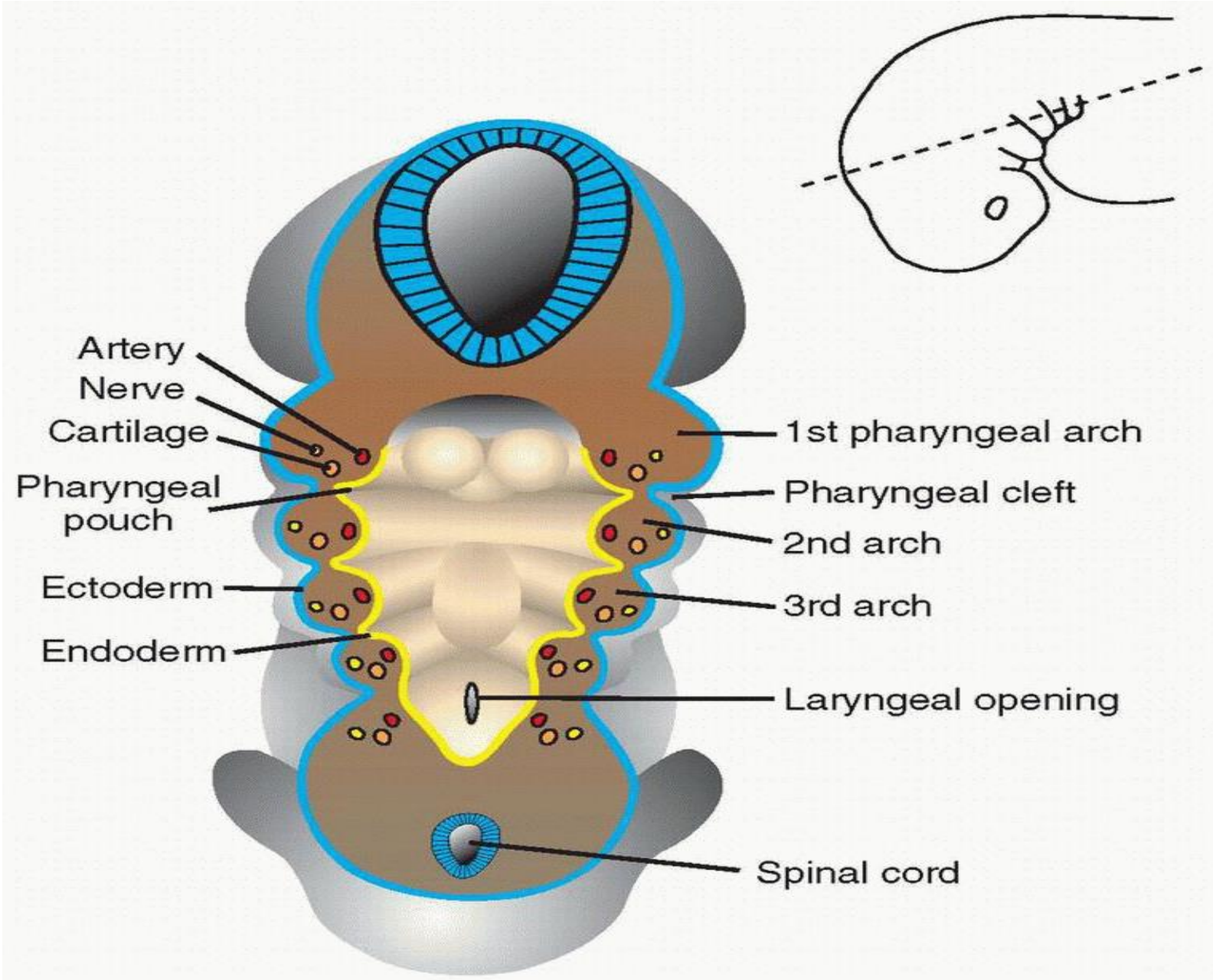
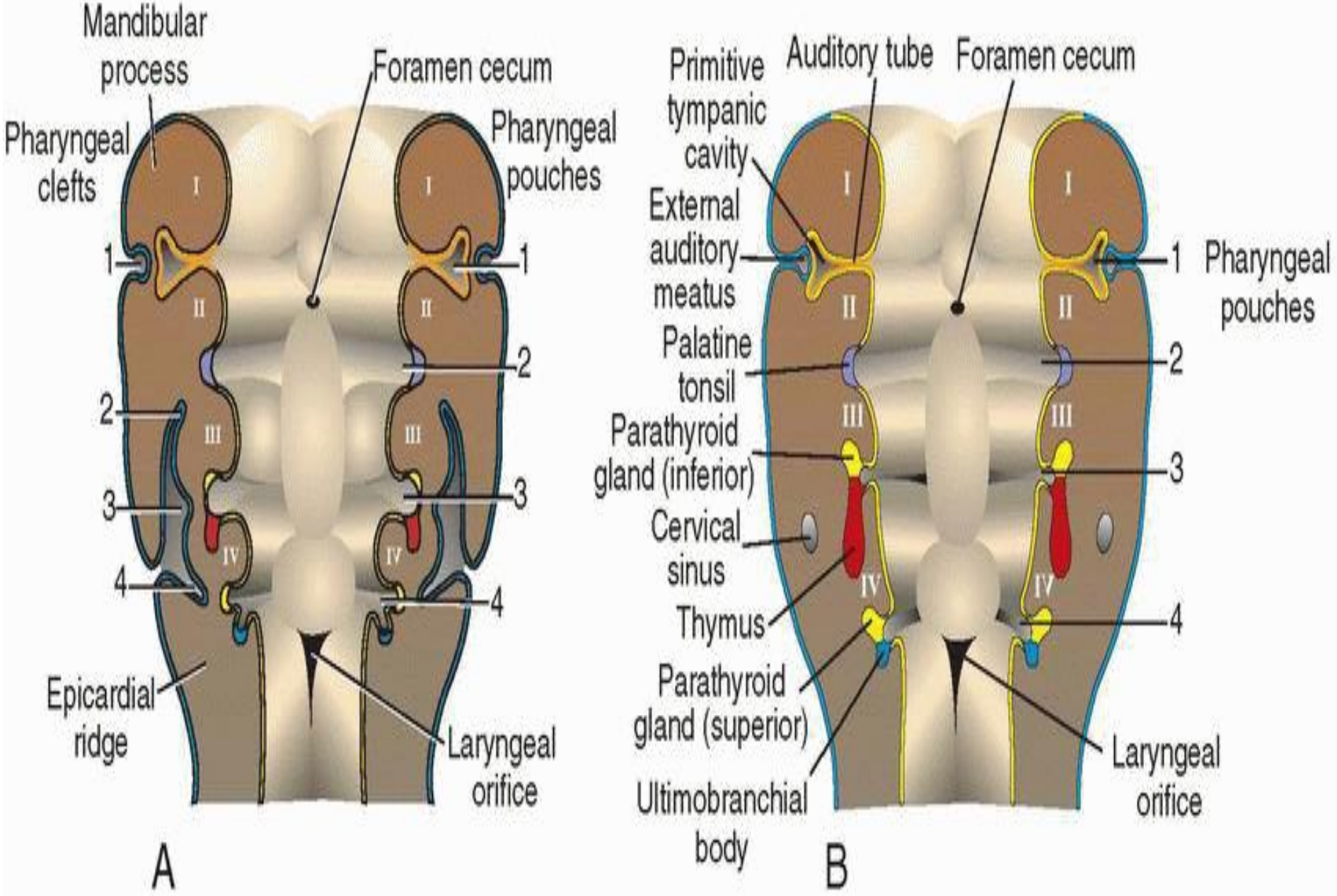

بسم الله الرحمن الرحيم

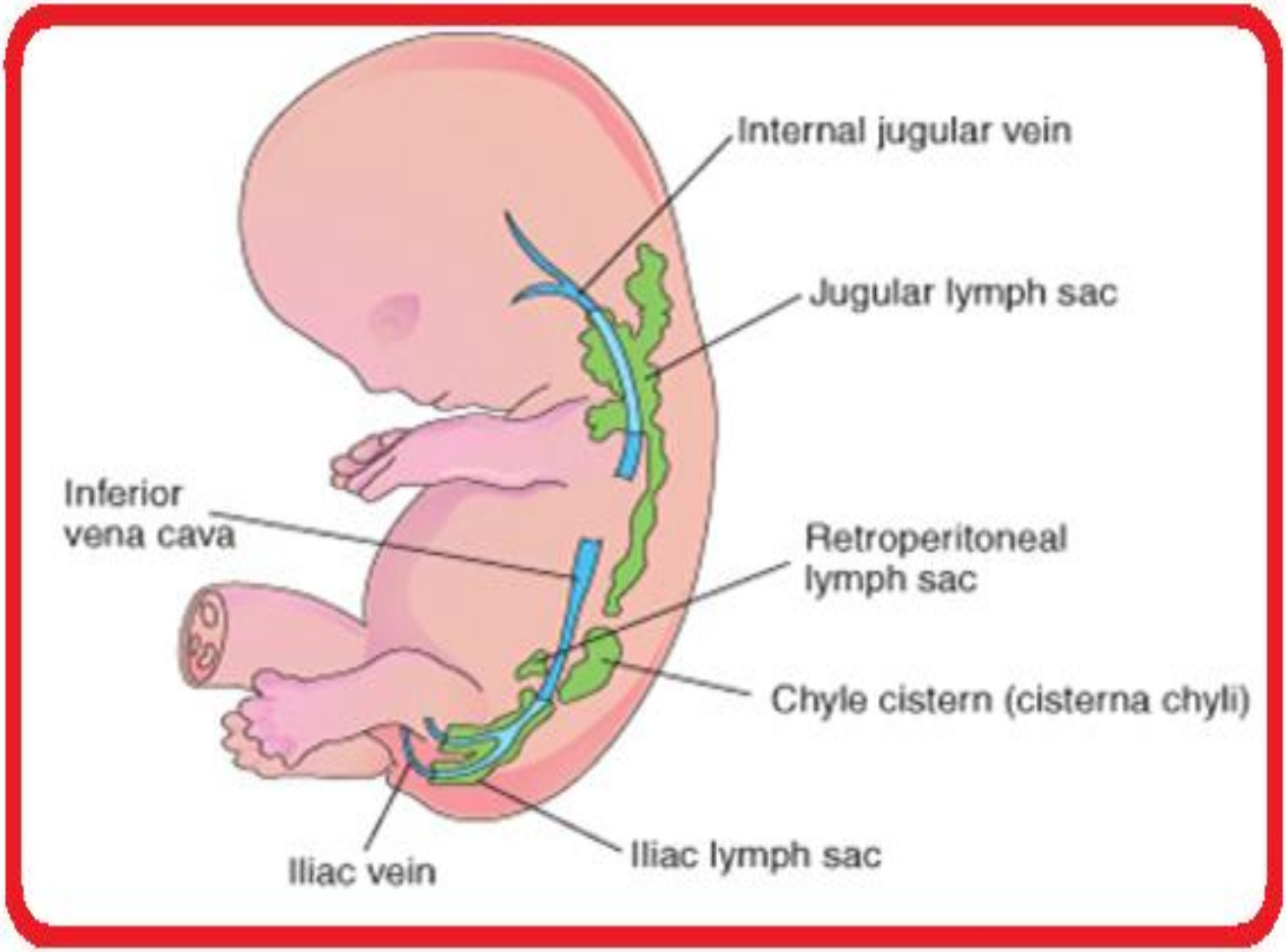

لا إله إلا الله محمد رسول الله

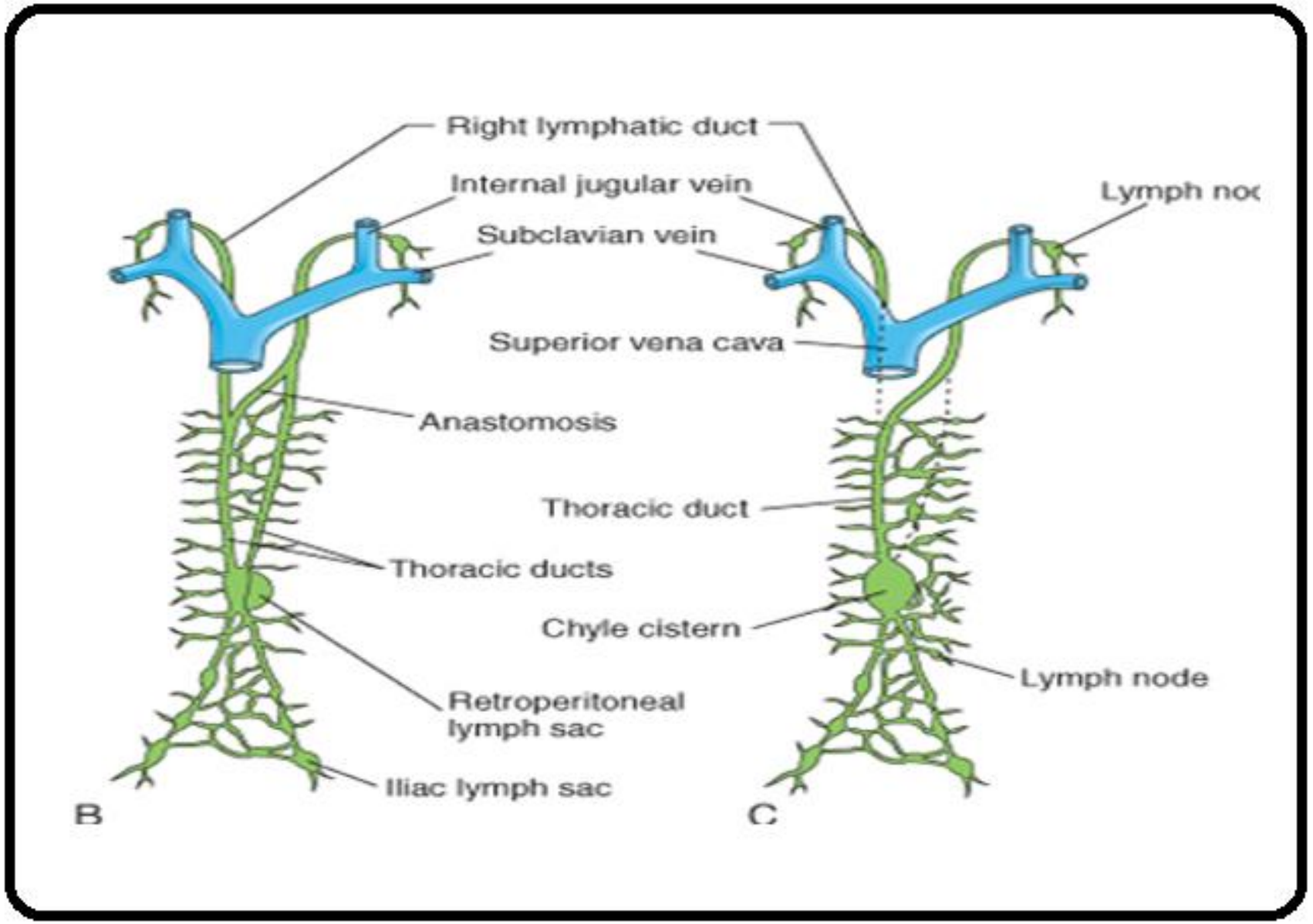

Artery
Nerve
Cartilage
Pharyngeal pouch
Ectoderm
Endoderm
1st pharyngeal arch
Pharyngeal cleft
2nd arch
3rd arch
Laryngeal opening
Spinal cord


Mandibular process
Foramen cecum
Pharyngeal clefts
Pharyngeal pouches
I
II
III
IV
1
2
3
4
Epicardial ridge
Laryngeal orifice
A
Primitive tympanic cavity
Auditory tube
Foramen cecum
External auditory meatus
Pharyngeal pouches
Palatine tonsil
Parathyroid gland (inferior)
Cervical sinus
Thymus
Parathyroid gland (superior)
Ultimobranchial body
Laryngeal orifice
B

Third Pharyngeal Pouch

The third and fourth pouches are characterized at their distal extremity by a dorsal and a ventral wing. In the fifth week, epithelium of the dorsal region of the third pouch differentiates into the inferior parathyroid gland, while the ventral region forms the **THYMUS**.


Internal jugular vein
Jugular lymph sac
Inferior
vena cava
Retroperitoneal
lymph sac
Chyle cistern (cisterna chyli)
Iliac lymph sac
Iliac vein


Right lymphatic duct
Internal jugular vein
Subclavian vein
Anastomosis
Thoracic ducts
Retroperitoneal lymph sac
Iliac lymph sac
B
Lymph noc
Superior vena cava
Thoracic duct
Chyle cistern
Lymph node
C

DEVELOPMENT OF THE LYMPHATIC SYSTEM

The lymphatic system begins to develop at the end of the sixth week

Approximately 2 weeks after the primordia of the cardiovascular system are recognizable.

Lymphatic vessels develop in a manner similar to that previously described for blood vessels and make connections with the venous system.

The early lymphatic capillaries join each other to form a network of lymphatics

DEVELOPMENT OF LYMPH SACS AND LYMPHATIC DUCTS

There are six primary lymph sacs present at the end of the embryonic period:

Two jugular lymph sacs near the junction of the subclavian veins with the anterior cardinal veins (the future internal jugular veins)

Two iliac lymph sacs near the junction of the iliac veins with the posterior cardinal veins

One retroperitoneal lymph sac in the root of the mesentery on the posterior abdominal wall.

One chyle cistern (L. cisterna chyli) located dorsal to the retroperitoneal lymph sac

Lymphatic vessels soon connect to the lymph sacs and pass along main veins; to the head, neck, and upper limbs from the jugular lymph sacs; to the lower trunk and lower limbs from the iliac lymph sacs; and to the primordial gut from the retroperitoneal lymph sac and the chyle cistern. Two large channels (right and left thoracic ducts) connect the jugular lymph sacs with this cistern. Soon a large anastomosis forms between these channels.

Thoracic Duct

The thoracic duct develops from the caudal part of the right thoracic duct, the anastomosis between the left and right thoracic ducts, and the cranial part of the left thoracic duct. As a result, there are many variations in the origin, course, and termination of the adult thoracic duct. The right lymphatic duct is derived from the cranial part of the right thoracic duct . The thoracic duct and right lymphatic duct connect with the venous system at the venous angle between the internal jugular and subclavian veins.

Development of the Lymph Nodes

Except for the superior part of the chyle cistern, the lymph sacs are transformed into groups of lymph nodes during the early fetal period. Mesenchymal cells invade each lymph sac and break up its cavity into a network of lymphatic channels-the primordia of the lymph sinuses. Other mesenchymal cells give rise to the capsule and connective tissue framework of the lymph nodes.

Development of the Lymphocytes:

The lymphocytes are derived originally from stem cells in the umbilical vesicle (yolk sac) mesenchyme and later from the liver and spleen. These early lymphocytes eventually enter the bone marrow, where they divide to form lymphoblasts. The lymphocytes that appear in lymph nodes before birth are derived from the thymus, a derivative of the third pair of pharyngeal pouches. Small lymphocytes leave the thymus and circulate to other lymphoid organs. Later, some mesenchymal cells in the lymph nodes also differentiate into lymphocytes. Lymph nodules do not appear in the lymph nodes until just before and/or after birth.

Development of the Spleen and Tonsils

The spleen develops from an aggregation of mesenchymal cells in the dorsal mesogastrium.

The palatine tonsils

It develop from the second pair of pharyngeal pouches and nearby mesenchyme.

The tubal tonsils develop from aggregations of lymph nodules around the pharyngeal openings of the pharyngotympanic tubes.

The pharyngeal tonsils (adenoids) develop from an aggregation of lymph nodules in the wall of the nasopharynx. The lingual tonsil develops from an aggregation of lymph nodules in the root of the tongue. Lymph nodules also develop in the mucosa of the respiratory and digestive systems

ANOMALIES OF THE LYMPHATIC SYSTEM

Congenital anomalies of the lymphatic system are uncommon. There may be diffuse swelling of a part of the body-congenital lymphedema. This condition may result from dilation of primordial lymphatic channels or from congenital hypoplasia of lymphatic vessels. More rarely, diffuse cystic dilation of lymphatic channels involves widespread portions of the body.

In cystic hygroma, large swellings usually appear in the inferolateral part of the neck and consist of large single or multilocular, fluid-filled cavities .


Cystic Hygroma

Hygromas may be present at birth, but they often enlarge and become evident during infancy.

Most hygromas appear to be derived from abnormal transformation of the jugular lymph sacs.

Hygromas are believed to arise from parts of a jugular lymph sac that are pinched off or from lymphatic spaces that fail to establish connections with the main lymphatic channels.

THANKS