SYMPATHETIC NERVES, N.PHRENICUS AND NN.SPLANCHNICI

Sympathetic ganglia

The sympathetic ganglia are swellings along the length of the pair of sympathetic trunks running longitudinally on either side of the vertebral column. The sympathetic trunks are located anterior to the cervical transverse processes, anterior to the heads of the ribs, on the antero-lateral aspects of the lumbar vertebral bodies, on the anterior aspect of the sacrum (medial to the ventral sacral foramina) and on the front of the coccyx. They are located at the site of synapses between the preganglionic and postganglionic neurons. There are a variable number of ganglia, approximately two (or three) cervical, eleven thoracic, four lumbar, four sacral and one coccygeal. The ventral rami of all spinal nerves are connected to the sympathetic trunk by gray rami communicantes. The ventral rami of T1 to L2 (L3) are also connected to the sympathetic trunk by white rami communicantes.

Sympathetic trunks

The two sympathetic trunks are longitudinal chains of pre and postganglionic neurons situated either side of the vertebral column. Each trunk extends from the base of the cranium to the coccyx where they are united at the ganglion impar. The sympathetic ganglia are located along the trunk as a series of swellings.

Each trunk is found alongside the carotid sheath and passes over the transverse processes of the cervical vertebrae. It passes anterior to the heads of the ribs in the thorax, antero-lateral to the lumbar and sacral bodies and medial to the coccyx where they meet.

Cervical Plexus (Medial Series):

Phrenic Nerves

Origin

Emerge as branches from the ventral rami of C3, C4, and C5, mainly from C4, at the superolateral borders of scalenus anterior.

The phrenic nerve contains not only motor fibers but also proprioceptive fibers to the diaphragm and sensory fibers to the pleura and pericardium. Sympathetic fibers may join the phrenic nerve from the cervical sympathetic ganglia.

Region

There are variations in the route taken by the right and left phrenic nerves, but they also share many common pathways as they descend into the thorax.

The phrenic nerves descend vertically and medially across the anterior surfaces of scalenus anterior. Here, it lies under cover of a layer of the prevertebral fascia.

Following their entry into the thorax through superior thoracic aperture run behind the subclavian vein and in front of the subclavian artery and its internal thoracic branch, between the mediastinal pleura and pericardium.

The nerves pass anterior to the pulmonary hilum, pierce the diaphragm. Right phrenic nerve with IVC (inferior vena cava) at T8, left phrenic nerve with esophagus and both, left and right, vagus nerves at T10.
Some of the roots may not join the main nerve trunk until just before leaving the neck; these are called the 'accessory phrenic nerves'.

Branches

Receive branches from the cervical sympathetic ganglia. There may also be connections with the internal thoracic sympathetic plexus.

Supply

Mediastinal and diaphragmatic pleura, fibrous and parietal serous pericardium, diaphragmatic peritoneum, diaphragm.

Clinical Pathology

It is uncommon for this nerve to be damaged during a neck dissection; but when damaged, it leads to paralysis of the diaphragm muscle on the same side.

Thoracic Sympathetic Trunks:

Greater Splanchnic Nerves

Origin

Emerge from the unification of the medial branches of the fifth to ninth (or tenth) thoracic sympathetic ganglia.

Region

Descend inferomedially across the bodies of the thoracic vertebrae to pierce the crus of the diaphragm to terminate in the celiac ganglion.

Branches

Branches to the: descending thoracic aorta, aorticorenal ganglion and branches to the suprarenal glands.

Supply

Preganglionic sympathetic and visceral afferent fibers to: descending thoracic aorta, aorticorenal ganglion, suprarenal glands and celiac ganglion.

Lesser Splanchnic Nerves

Origin

Emerge from the unification of the medial branches of the ninth and tenth thoracic sympathetic ganglia and their interconnecting trunks.

Region

Descend inferomedially on the vertebral bodies, piercing the crus of the diaphragm along with the greater splanchnic nerves to terminate in the aorticorenal ganglion.

Branches

Renal branches.

Supply

Preganglionic sympathetic and visceral afferent fibers to: aorticorenal ganglion and celiac plexus.

Lowest (least) Splanchnic Nerves

Origin

Emerge from the twelfth (last) thoracic ganglion of the sympathetic trunk.

Region

Descend inferomedially on the vertebral bodies, pierce the crus of the diaphragm with the sympathetic trunk, and terminate in the renal plexus.

Branches

The lowest splanchnic nerves do not have any branches.

Supply

Sympathetic and visceral afferent fibers to: aorticorenal ganglion and adjacent plexus.
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