UNIT 4. DISSECTION: VERTEBRAL COLUMN AND SPINAL CORD

STRUCTURES TO IDENTIFY:
Cervical vertebrae          Subarachnoid space
Thoracic vertebrae         Dentate ligament
Lumbar vertebrae           Spinal cord
Sacrum                     Conus medullaris
Supraspinous ligament      Cauda equina
Interspinous ligament      Filum terminale
Anterior longitudinal ligament Spinal nerve
Posterior longitudinal ligament Ventral root
Ligamentum flavum          Posterior Root
Meninges
  Dura mater
  Arachnoid mater
  Pia mater

DISSECTION INSTRUCTIONS:

1. Clean the lamina (the area between the transverse process and the spine) on both sides. You are retracting the deep back muscles from the level of C3 to the middle part of the sacrum. Save a few dorsal rami of the thoracic nerves, so that they may later be traced to the main trunk of the nerves from which they arise.

2. Now perform a laminectomy from the level of C3 to the sacrum. The successive laminae and spines are held together by the ligamenta flava and the interspinous ligaments and may be removed in one piece (N. plate 158; G. plates 4.18, 4.19).

3. When the vertebral canal is opened, a narrow space filled with fat will be exposed lying between the vertebrae and the dura mater of the spinal cord. This is the epidural space. In the fat are the spinal arteries and the internal venous plexus. The spinal arteries are paired series of vessels that enter the canal through the intervertebral foramina. The venous plexus is drained by spinal veins that leave the canal through the intervertebral foramina (N. plate 173; G. plate 4.20).

4. Clean the external surface of the spinal dura by removing the epidural fat and the venous plexus. Observe the series of lateral projections of dura mater, which pass into the intervertebral foramina. The roots of the spinal nerves are enclosed in here (N. plates 169, 173; G. plates 4.41, 4.42).

5. Open the dura by a longitudinal incision along its entire length; reflect the cut edges laterally and pin them to the sides of the vertebral canal to expose the spinal arachnoid mater, the second of the spinal coverings (N. plate 169; G. plates 4.41 - 4.45).
6. Slit the arachnoid longitudinally to expose the spinal pia mater, the spinal cord and the roots of the spinal nerves. Notice the arachnoid trabeculae that traverse the subarachnoid space to attach to the pia.

7. Identify the tapering inferior end of the spinal cord, from which the lumbar and sacral nerve roots arise. This is the conus medullaris. From the tip of the conus a threadlike structure, the filum terminale, continues downward through the subarachnoid space (N. plates 160, 161; G. plate 4.41).

8. Observe that the diameter of the spinal cord is greater in the lower cervical region (the cervical enlargement) and in the lower thoracic region (the lumbar enlargement) (N. plate 161; G. plate 4.41).

9. The posterior roots are made of up afferent (sensory) nerve fibers and arise from the dorsal horn of the spinal cord on the posterior aspect of the cord. The ventral roots are made up of efferent (motor) nerve fibers and arise from the ventral horn on the anterior aspect of the cord. Each root arises not as a single structure, but as a linear series of rootlets, which unite to form a single root. The posterior and ventral roots of each nerve remain distinct within the vertebral canal and unite to form a spinal nerve. Roots increase in length from above downward, since the length of the cord is so much less that that of the vertebral canal. The lumbar and sacral roots (the longest), which arise from the lower part of the cord, form a tail-like aggregation of filaments known as the cauda equina (N. plates 160, 161; G. plates 4.41, 4.44).

10. Laterally, between the posterior and ventral roots, the pia is thickened along the length of the cord to form the denticulate ligament (N. plates 169, 170; G. plate 4.42, 4.44).

11. With the bone forceps, chip away the articular processes forming the posterior boundary of one or two of the intervertebral foramina in the lower thoracic region to expose the posterior root (spinal) ganglion and the spinal nerve. Observe that the trunk of the spinal nerve is very short, as each divides almost immediately into a anterior and posterior primary ramus (N. plate 170; G. plates 4.45, 4.46, 4.49).