Neurosurgical Techniques
Neurosurgical Techniques

Laminectomy for the Removal of Spinal Cord Tumors

J. Grafton Love, M.D.
Section of Neurologic Surgery, Mayo Clinic and Mayo Foundation, Rochester, Minnesota

LAMINECTOMY is a surgical procedure consisting of the removal of part or all of one or more laminae for the exposure of the spinal meninges, spinal cord, nerve roots, and intraspinal lesions.

Fig. 1 depicts 6 steps in the performance of a classic bilateral laminectomy consisting of the removal of 3 spinous processes and 3 pairs of laminae. Often a tumor is removed with the sacrifice of only 1 spinous process and 1 pair of laminae. On the other hand, large and extensive tumors may require the removal of many spines and laminae. Adequate exposure is essential and everything possible should be done to avoid further damage to the vital spinal cord.

The first step in laminectomy is incision of the skin and subcutaneous tissues down to the dorsal fascia through which the tips of the spinous processes can be seen and easily palpated. The dorsal fascia and supraspinous ligament are incised in the midline. In order to minimize bleeding and postoperative atrophy of the muscles, it is important to reflect the periosteum with the muscles. The muscles and ligaments are therefore stripped subperiosteally and reflected laterally with the help of an Adson laminectomy chisel. As the muscles are stripped from the spinous processes and laminae, gauze sponges should be packed in the gutter. This maneuver is usually sufficient to control any except arterial bleeding; and further, it “iron out” the muscles and facilitates the introduction of the self-retaining retractor and the exposure of the laminae and ligamentum flavum.

When the soft tissues have been reflected laterally to the articulating facets and the retractor has been inserted, bone removal begins. If the surgeon knows the exact location of the tumor, he may remove bone overlying the tumor (with or without x-ray control) and then work above and below the lesion until adequate exposure is obtained. When a normal amount of extradural fat is encountered above and below the lesion, the extent of the tumor is usually revealed. Pulsations may be seen in the dural sac above the obstructing lesion but not below it. The mass has a muting effect on the dural pulsations. If there is a question regarding the location of the tumor, a minimal amount of bone and ligamentum flavum should be removed, and intraspinal extradural exploration with a silver probe or a size 8 F catheter utilized to estimate the presence or absence of an abnormal mass.

When sufficient bone has been removed to expose the tumor, careful hemostasis should be accomplished before beginning the actual tumor removal. If the tumor is extradural and there is no need to open or sacrifice dura, the problem of hemostasis is much simpler. If the hydrostatic effect of the cerebrospinal fluid within an intact arachnoid and dura mater can be maintained, electrocoagulation, silver clips, muscle pledges, or gelfoam can be employed to control bleeding.

If the tumor is intradural or a part of the dura has to be resected because of tumorous involvement, the dura should be opened widely enough to expose the lesion and the nutrient vessels; if possible, these vessels should be secured before removing the tumor from its bed. The first opening in the dura and arachnoid should always be rostral to or above the lesion in order to avoid the additional spinal cord damage which may accompany sudden initial release of fluid caudal to or below the tumor. Another reason for