Microsurgical ganglionectomy for chronic pain syndromes

Technical note

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An improved microsurgical technique for lumbosacral ganglionectomy is described.

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POSTERIOR sensory rhizotomy remains part of the contemporary neurosurgical armamentarium although its use for chronic pain syndromes remains controversial. Success rates reported recently have varied from 25% to 64%. Afferent axons of the ventral roots were believed until recently to constitute only a very small percentage of all ventral root myelinated fibers. Coggeshall, et al., reported substantial percentages of small, unmyelinated axons, 0.6 to 1.5 μ in diameter in the ventral lumbosacral roots of the cat, macaque, and man. In neurophysiological studies using teased fiber preparations these authors revealed sensory receptive fields for some of these “C” fibers in feline pelvic viscera and tail joints. These small axons had high thresholds for stimulation, and it was surmised that they might have nociceptive functions. Extirpation of the dorsal ganglion caused degeneration of most of these small axons in the ventral roots, implying that their perikarya were probably in the sensory ganglion. Another potential problem with the intradural approach is the frequent occurrence of bridging fascicles between neighboring sensory roots of the cauda equina. These roots can be easily missed with the standard intradural rhizotomy techniques.

To familiarize ourselves with the surgical anatomy of the lumbosacral roots and ganglia, we used the operating microscope to dissect the roots and ganglia of L1–S5 bilaterally in 20 cadavers, for a total of 400 roots. We were unable to establish the presence or absence of macroscopically visible fiber bundles passing directly from the sensory ganglion into the ventral root. We were able, however, to develop a microsurgical ganglionectomy technique that has proved reliable in 18 clinical cases to date.

In 1966, Scoville noted that for extradural sensory rhizotomy, the distal root sleeve and ganglion could be exposed with a
minimum of bone removal. With the operating microscope, we have confirmed that the smaller ventral root is invariably separated from the larger sensory root by a discrete dural partition. This septum begins just beyond the dural sac, extends to beneath the distal part of the ganglion, and facilitates the identification of motor and sensory elements.

**Technique**

Our present technique obtains an exposure similar to that used by Scoville for extradural rhizotomy, although we use a Hall drill* to pare the lateral lamina and inferior facet margins. Under magnification of × 16, the dura over the proximal right sensory ganglion and distal right root of L-4 is opened with a No. 11 scalpel (Fig. 1), and the substance of the ganglion is separated from its dural capsule with a microspatula. This permits the surgeon to elevate the ganglion up and away from the dural septum protecting the motor root. The small segmental artery and vein running in this septum can usually be identified and protected. A Weck hemoclip† is applied to the right L-4 sensory root (generally bifid), just proximal and to the left of the ganglion. The sensory root is then divided immediately beyond the clip. Leakage of cerebrospinal fluid does not occur because the subarachnoid space at this level is effectively sealed off by arachnoid trabeculae. The ganglion corpus is then elevated and reflected laterally to the right along the intact dural septum overlying the motor elements. A clip is applied across the distal ganglion, and the ganglion excised by an incision just proximal to the left of this clip.

Pontocaine root blocks under x-ray control were done routinely as a part of the preoperative evaluation. In addition, some cases were operated on under local anesthesia, using intraoperative stimulation techniques. Only time will tell if our results differ significantly from the discouraging results reported by neurosurgeons who use more traditional rhizotomy techniques. Our longest follow-up in 18 cases is 24 months. We have been satisfied with the technical simplicity of this procedure.

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**References**


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*Drill manufactured by Hall International, Inc., Santa Barbara, California 93103.
†Hemoclip manufactured by Edward Weck & Co., Inc., Long Island City, New York 11101.
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