

Commentary

In this issue of Journal of Neuroscience in Rural Practice, Chowdhury *et al.*,^[1] present a rare case of C7 spinal dumbbell schwannoma with large inferolateral extension removing through anterolateral (interscalenic and transforaminal) approach. I would like to take this opportunity to discuss the recent advances in the management of dumbbell spinal schwannomas.

Spinal schwannomas constitute approximately 30% of primary spinal tumors, and they present as dumbbell shaped (with contiguous intraspinal, foraminal and extraforaminal components) in 10-15% of the cases. They arise from schwann cells and predominantly originate from the sensory root of the spinal nerve. Spinal schwannomas generally present with neurological signs due to spinal cord and/or nerve root compression. These tumors are slow growing and usually attain a large size before becoming symptomatic.^[2]

For preoperative evaluation of spinal schwannomas, magnetic resonance imaging with contrast enhancement is the standard examination to evaluate the tumor location and extension, especially in the soft tissue. Although, it is very helpful in determining the precise location of the vertebral artery (VA). Computerized tomography is useful to differentiate erosive and compressive bony change. Monitorization of somatosensory evoked potentials and intraoperative nerve root stimulation are certainly of value to help for surgical planning.^[3]

Successful management of spinal dumbbell tumors depends on adequate exposure and complete resection in one stage with avoidance of intra- and post-operative complications. Despite being benign tumors, spinal schwannomas may show recurrence after subtotal removal and revision surgeries are associated with more complications. Klekamp and Samii noted a recurrence rate of 10.7% at five years and 28.2% at 10 to 15 years in patients with spinal sheath tumors.^[4]

Surgical approaches for cervical dumbbell tumors remain a matter of controversy. In recent years, various surgical approaches for dumbbell tumors, have been described with their respective advantages and disadvantages depending on the development in neuroimaging and neurosurgical techniques.^[5-8] However, these various approaches require a great deal of skillful technique and surgical experience to perform.

Kim and McCormick advocated that because most of these tumors do not extend very far laterally, they can be effectively managed with a single posterior

approach combined with partial laminectomy and unilateral facetectomy without producing post-operative instability.^[5,6] Although posterior approach is the familiar one to most neurosurgeons, in the case the dumbbell type of tumor, which includes a large extension toward the outside of the spinal canal at the level of the cervical vertebrae, the posterior approach only allows removal of intraspinal part of the tumor, whereas extraspinal part of the tumor is relatively inaccessible. Additionally, removal of all these structures may result in immediate or delayed instability of the spine. As for removal of intraspinal part of the tumor located ventral to the spinal cord, the posterior or posterolateral approach has been considered to involve a high risk of damaging the spinal cord as a result of various spinal cord manipulations. The VA cannot be controlled posteriorly and is therefore at risk.

Kyoshima *et al.*, reported two cases of dumbbell C2 schwannomas involving both sensory and motor rootlets. They proposed that dumbbell C2 schwannomas can be satisfactorily managed with a posterior approach, because of the anatomic feature consisting of the absence of an intervertebral foramen between C1 and C2 and the wide C1-C2 interspace. They reported that the resection of the cervical C2 nerve branches distally to the lateral margin of the tumor caused sensory impairment of the C2 dermatome in one patient after surgery. Therefore, they advocated that cutting to the C2 nerve root induces limited or no sensory deficit because of compensation provided by the other roots constituting the superficial nervous plexus.^[7]

Lot and George asserted that anterolateral approach allows the exposure of any part of dumbbell tumors whatever their extensions (extraspinal, extradural, and intradural). They also suggested that a very limited bone drilling to widen the foramen can be used to reach the proximal tip of the tumor in patients with entirely extradural neuromas.^[3]

Iwasaki *et al.*, advocated that conventional anterior approach with partial corpectomy is more appropriate than the anterolateral approach for the total removal of some kinds of cervical dumbbell type neurinomas.^[8] Because, the anterolateral approach has several disadvantages as distinct from an anterior approach, such as the possibility of injuring the lower cranial nerves and the unfamiliarity of the exposure for many neurosurgeons. However, Iwasaki *et al.*, needed the anterior fusion with grafted bone to prevent post-operative spinal deformity.

In my opinion, all these approaches above mentioned have several advantages and disadvantages relatively. The surgical approach used for tumor resection will depend on the anatomic configuration of the tumor and its relationship to surrounding bony and soft tissue structures and the preferences of the surgeon, as stated previously.

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