Cervical spinal schwannoma

Spinal schwannoma are most frequently seen in the cervical and lumbar regions, far more frequently than in the thoracic spine.

Classification

Asazuma Classification

Eden's classification for dumbbell tumors of the spine, long considered a “gold standard,” no longer is sufficient to determine surgical strategy in view of recent advances in computed tomography and magnetic resonance imaging.

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<tr>
<th>Type</th>
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<tr>
<td>Type I</td>
<td>Intra- and extradural type</td>
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<tr>
<td>Type II</td>
<td>Intra- and extradural and paravertebral type</td>
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<tr>
<td>Type III</td>
<td>Extradural and paravertebral type</td>
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<td>Type IV</td>
<td>Foraminal and paravertebral type</td>
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Treatment

Cervical dumbbell spinal schwannomas with an extraspinal extension through the intervertebral foramina pose significant challenges for complete resection while avoiding injury to the vertebral
artery and preserving the integrity of the cervical spine. Posterior approaches may require an extensive soft-tissue dissection and bone removal with potential spinal instability. Moreover, they offer only a limited access to an extraspinal tumor component that entails an additional anterior approach for complete resection of a dumbbell-shaped lesion.

Goga et al., used an anterolateral transformaminal approach that preserves the bony elements of the intervertebral foramen and offers a comprehensive access to the extraspinal, foraminal and intraspinal/intradural components of a cervical dumbbell tumor.

Outcome

Cervical spinal schwannoma is benign, and outcomes after surgical resection are generally excellent. A surgical dilemma sometimes arises as to whether to perform total tumor removal, which carries a risk of sacrificing the nerve root, or subtotal removal, where the risk can be tumor recurrence.

Case series

Chowdhury et al. reported schwannomas arising from C1, C2 and C3 spinal nerve roots were regarded as high cervical spinal schwannoma. All patients with high cervical spinal schwannomas that were consecutively operated microneurosurgically from 2006-2010 were included in the study. Postoperatively all patients were followed up regularly both clinically and neuro-radiologically (MRI of cervical spine).

Average follow up was 31.5 months. The mean age of the series was 35.8 years (range 10-61 years). There were 8 male and 7 female patients. The mean duration of symptoms at the time of presentation was 32 months (range 06 months-5 years). Two schwannomas were completely extradural, seven were intradural and rest six were interdural or hourglass type (both extra and intradural) as identified during surgery. The standard midline posterior approach was used in all patients. A C2 hemilaminectomy or C2 laminectomy with or without cutting of posterior arch of atlas was used for most intradural and large interdural C2 schwannomas. Tumor removal was complete in all cases. Preservation of the nerve root fibers was not possible in 9 cases and was possible only in 3 cases. In two patients CSF leak developed after operation. One patient who had severe myelopathic features with bed sore failed to improve and expired 5 months after operation. Rest of the patients showed postoperative improvement in their preoperative symptoms and returned to their normal life by the end of sixth month. There was no tumor recurrence in any patient till last follow up.

Proper 3-D anatomical orientation & physiological knowledge, deep neuro-radiological observation, pathological appreciations and micro-neurosurgical skill and expertization can make the surgical management of these tumors (in a surgically complex site) simple with gratifying result (i.e. neurological outcome) without extensive bone removal or soft tissue manipulation through a standard midline posterior approach.

Thirty cases of cervical schwannomas treated by Yamane et al. were retrospectively reviewed; initial symptoms, tumor location, Eden classification, surgical method, functional outcome, and tumor recurrence were investigated. All permanent motor deficits were the result of resecting functionally relevant nerve roots (i.e., C5-8). The rate of permanent sensory deficit was 11% after C1-4 nerve root resection, and 67% after C5-8 nerve root resection. Permanent neurological deficits occurred in 14% of patients younger than 40 years and 38% of those older than 40. Dumbbell tumors were associated with the need for total or ventral nerve root transection, as well as with a high incidence of tumor
recurrence. The incidence of permanent neurological deficit was significantly higher in patients undergoing C5-8 nerve root resection, and tended to be higher in those over 40.

Forty-two patients with cervical dumbbell tumors were analyzed retrospectively using a new three-dimensional classification.

To establish optimal surgical strategies, we considered shapes and three-dimensional locations of cervical dumbbell tumors based on diagnostic images and intraoperative findings.

Forty-two cervical dumbbell tumors were characterized according to transverse-section images (Toyama classification; nine types) and craniocaudal extent of intervertebral and transverse foraminal involvement (IF and TF staging; three stages each).

Type IIIa tumors, involving dura plus an intervertebral foramen, accounted for 50% of cases. A posterior approach was used in 35 patients; 7 others underwent a combined anterior and posterior approach. A posterior approach was used for all type IIa and IIIa tumors, and for some type IIIb (upper cervical), IV, and VI tumors; a combined posterior and anterior approach was used for type IIb and the remainder of type IV and VI. Reconstruction was performed using spinal instrumentation in 4 patients (9.5%). Resection was subtotal in 6 patients (14.3%) and total in 36 (85.7%).

Systematic, imaging-based three-dimensional characterization of shape and location of cervical dumbbell tumors is essential for planning optimal surgery. The classification used here fulfills this need.

Case reports

Pokharel et al. reported a case of extradural cervical schwannoma in a 14-year-old boy with swelling in the posterior triangle of his neck. The radiological features suggested solitary extradural cervical schwannoma which was confirmed later by histopathological findings. There were no postoperative neurological complications.

Perry et al. reported in 2019 the third case of synchronously presenting primary progressive multiple sclerosis (MS) and spinal schwannoma. A 65-year-old man presented with six months of progressive weakness and pain of the right shoulder, forearm, and hand. MRI demonstrated a contrast-enhancing transforaminal lesion at C7, most consistent with a benign nerve sheath tumor. Additional history disclosed several years of worsening fatigue, accompanied by bilateral weakness and lancinating leg pain. MRI of the neuraxis demonstrated abnormalities consistent with chronic demyelinating disease intracranially and within the spinal cord; cerebrospinal fluid (CSF) analysis revealed nine oligoclonal bands and an elevated IgG index, resulting in the diagnosis of MS. Given the symptomatic C7 lesion, the patient subsequently underwent right C6-C7 facetectomy, gross total resection of the tumor, and C6-T1 posterior instrumented fusion. Postoperatively, the patient rapidly recovered normal right upper extremity function, and pathology confirmed benign schwannoma. Synchronously presenting co-morbid neurologic diagnoses are exceedingly rare. Nonetheless, the high incidence and protean nature of MS make it particularly susceptible to such confounding clinical cases. Correspondingly, MS should be considered when neurologic abnormalities are not compatible with a focal radiographic feature.
lesion, and the present report emphasizes the value of a good history and exam in unraveling similarly challenging cases.

References


