Neurosurgical Forum LETTERS TO THE EDITOR

Pedicular resection for ventrally situated spinal tumors

TO THE EDITOR: We found the article by Visco et al.¹ very interesting (Visco ZR, Liu DD, Leary OP, et al. A transpedicular approach to complex ventrally situated thoracic intradural extramedullary tumors: technique, indications, and multiinstitutional case series. *Neurosurg Focus*. 2021;50[5]:E19). These authors reported 5 cases treated with the transpedicular approach to ventrally located extramedullary tumors. Intraoperative videos were nicely presented with outstanding microsurgical techniques, as well as excellent patient outcomes. No complications were reported in their study. Despite their undeniably good results, we noticed that all patients required a major spinal fusion after surgery, as shown in the postoperative radiographs. Artifacts from titanium implants may make it difficult to follow up these patients, especially in those with genetic conditions, such as neurofibromatosis, which may require additional surgery for de novo tumors. Besides that, major spinal fusion increases surgical morbidity (length of the procedure, blood loss, etc.) and costs, adding a reconstruction procedure to the oncological procedure itself.

We have successfully treated intradural extramedullary tumors located anteriorly to the spinal cord by using the technique of tenting the dentate ligament with sutures and rotating the spinal cord, even for large calcified meningiomas, none of which required pedicular resection.² Interestingly, in using intraoperative neurophysiological monitoring before and after rotating the dentate ligament with 5.0 Prolene sutures, we observed no physiological change in our practice. We preferred using miniplates for closure of the non-expandable laminotomies instead of standard laminectomies, restoring the posterior muscles over the laminae at the end of the procedure. In our humble opinion, there is no need for pedicular resection in these tumors, except in very extensive dumbbell tumors that may require facet joint resection for total removal.

Regardless, we congratulate the authors for their very nice results as well as for discussing the challenge of resecting ventrally located tumors.

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Disclosures

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Response

We thank the author for his commentary on our paper. Let me start by saying that we agree with many of his sentiments about the need for complex approaches and instrumentation subsequent to ventral intradural extramedullary tumor resection. The overwhelming majority of patients in our practice who harbor intradural extramedullary tumors do not require anything more than a laminectomy and dorsal durotomy. As is outlined in the beginning of the video abstract accompanying our paper, we also frequently utilize the dentate ligament “tenting technique” to afford optimized access to the ventral spinal cord. Additionally, we will tack the arachnoid, and even on occasion dispensable thoracic nerve roots, to the contralateral side in an effort to gently rotate the spinal cord. These spinal cord rotation techniques are safe and effective, allowing the surgeon to access the ventral corridor effectively in most situations.

Despite the success of this accepted technique, there are select situations in which we believe it is important to more directly access the space anterior to the spinal cord. Strictly ventral midline tumors that cause dorsal, rather than lateral, effacement of the spinal cord are a particular challenge. Case 2 in our paper illustrates how 2 of the patient’s 5 intradural tumors were located completely in the ventral midline compartment. In cases in which there is no tumor laterality, rotating the spinal cord with the dentate ligament tenting technique may not be effective to visual-

ize the entire tumor. In these situations, there is a higher risk of leaving tumor behind on the side contralateral to the approach. Additionally, the surgeon may be tempted to more aggressively rotate the spinal cord, with a heightened risk of neuromonitoring data loss. Alternatively, one could consider accessing the ventral intradural space bilaterally. This would necessitate cutting dentate ligaments on both sides of the spine and rotating the spinal cord in each direction. Although this is possible, a fairly significant amount of spinal cord rotation is needed in cases of midline ventral cord tumors. If it is realized that the spinal cord cannot tolerate such rotational forces, the surgeon may be forced to close the durotomy defect and perform further bone removal to access the dura more laterally.

Case 5 in our paper illustrates a unique situation in which the patient had symptomatic severe spinal cord compression from a ventral T9 meningioma and a circumferential T11 metastatic non-small cell lung carcinoma deposit with an associated pathological fracture. In this particular case, the patient required 360° spinal cord decompression at T11 and was declining neurologically. Because instrumentation was already planned to address the T11 lesion, we believed that it would be safer to approach the ventral T9 meningioma with a transpedicular approach in an effort to diminish any undue spinal cord manipulation, given the patient's tenuous neurological state.

Select situations exist whereby a previous attempt has been made to resect a ventral intradural extramedullary tumor via a traditional dorsal midline approach. Case 3 in our paper describes a patient who had previously undergone attempted resection of a ventral calcified meningioma at another institution. During spinal cord manipulation to access the anterior corridor, loss of neuromonitoring signals was encountered, and the case was aborted. The patient was left with a multilevel laminectomy defect and a large, ventral calcified tumor. Specific factors that led up to this initial result are noteworthy. The patient had a firm calcified tumor. These tumors are inherently more challeng-

ing to remove. Just as one would not approach a calcified thoracic disc via a dorsal midline approach without taking down the subjacent pedicle and facet joint, one should take great caution in attempting to resect a firm calcified tumor with a dorsal midline corridor. Radiographically, many meningiomas appear "calcified." However, the texture of the calcification can be granulated, which is friable and relatively easy to aspirate, or it can be exceptionally firm. There is no reliable way to radiographically predict the firmness of a calcified tumor. In this particular case, the patient had also undergone a prior midline approach, with subsequent radiation causing significant scarring. Additionally, she was morbidly obese. All of these factors were taken into account, leading us to design an approach to safely access the tumor without cord manipulation. An extracavitary approach afforded us a virgin corridor to the ventral spinal cord, allowing safe en bloc resection of the meningioma. If it is possible to perform, en bloc resection of the tumor may decrease the chances of tumor recurrence over time.

The argument against instrumentation is strong in relation to the artifact and the inability to properly follow these patients radiographically. However, the advent of radiolucent hardware may aid in the ability to follow these tumors over time when instrumentation is necessitated.

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