

Extra-Axial spinal Lumbar Neoplastic Lesions. A Rare Meningotelial entity: Fibroblastic Meningioma. Case Report and Revision of Litterature

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Abstract

Background and Importance

In the field of spinal tumors, and in particular among extra-axial spinal and peripheral nerve tumors, the occurrence of dumbbell lumbar meningioma has not been reported in the literature. In the present study we describe a case of a patient suffering from dumbbell-shaped lumbar meningioma. This tumor resulted, after postoperative histological examination, a fibroblastic meningioma, WHO I grade, a very rare entity. Dumbbell meningiomas are extremely uncommon, comprising only 2–3.6 %.

Clinical Presentation

An 81-year-old man presented with history of gradually increasing lumbar pain, not related with decubitus and axial load, and right sciatica for 6 months. Another clinical feature was sensitive and motor (4/5 BMRCI) deficits at level of right L5 radicular territory. MRI shows a dumbbell lesion in right neuroforamen L5-S1. With the patient in a prone position, we exposed and excised the tumor via a one stage posterolateral approach, through a hemi-laminectomy of L5, starting from a midline lumbar right L5-S1 interlaminar approach, extended to far lateral right articular and extra-articular region. We pre-operatively assumed the mass was a schwannoma because of its location and dumbbell shape, and planned the surgical procedure with use of continuous intraoperative neurophysiological neuromonitoring, to minimize the concrete risk of a possible intraoperative neurologic damage and preoperative neurological deficits worsening. Patient did not develop more deficits and the tumor resulted a fibroblastic meningioma. Patient recovered upright posture and walking during the first postoperative day, with the aid of a lumbar corset. The surgical wound was regular and subfascial lumbar drainage was removed on the first postoperative day. During postoperative recovery no additional neurological deficits appear and the low back pain and the right sciatic pain partially improved. On the fifth postoperative day patient was discharged from the hospital with the indications to wait for the histological examination result for any possible subsequent terapie and for the appropriate follow-up.

Conclusion

This patient-case report suggests that dumbbell shape of a spinal tumor (in particular at level of lumbar spine) has to be underwent to a very careful differential diagnosis, considering the possibility to discover, among the most frequent histology neoplastic lesions, the presence of histologically more rare tumors. This knowledge is very important from the beginning of surgical and therapeutic planning to the diagnostic and possible postoperative adjuvant therapeutic follow-up of patient.

Keywords: dumbbell, fibroblastic meningioma, spinal tumors, schwannoma

Short title: dumbbell spinal fibroblastic meningioma

Background and Importance

Schwannoma and meningioma are the two most common intraspinal tumors and intraspinal tumors usually occur in the spinal canal. [1,2,3]. Only few reports of dumbbell meningioma are described in the literature. Intraspinal meningiomas are usually located in the spinal canal, and do not extend through the intervertebral foramen. [4,5,6,7] Dumbbell-shaped tumors account for 6%–14% of all spinal neoplasms. [8] Dumbbell meningiomas are extremely uncommon, comprising only 2–3.6 % [4]

Clinical Presentation

An 81-years-old man presented with gradually increasing lumbar pain and recurrent right sciatica radiating posteriorly to the leg for 6 months, progressive loss of strength in the lower right limb and numbness not related with decubitus and axial load. For this reason he had been treated with oxycodone 15 mg and paracetamol 1000 mg twice a day without benefit. The neurological examination revealed slight muscle weakness and hypesthesia of the right limb (4/5 BMRC) and gait instability. The operation was performed using a single stage posterolateral approach with paramedian linear incision, without any instrumentation, planning a continuous intraoperative neurophysiological monitoring starting from a known baseline.

Surgical technical description

A right paramedian incision 2 cm from the midline was made from the sacrum (S1-S2) to the L2 spinous process. After opening the fascia by arc

incision, unilateral subperiosteal elevation of the paraspinal muscle was performed, preserving the spinous processes and supra/intersegmental ligaments. The paraspinal muscles were then transected using electrocautery and the laminae L5 and S1 and facet complex were exposed. The adjacent ligamentous attachments were stripped. Under microscope, with microsurgical technique, Hemi-laminectomy of L5, starting from a midline lumbar right L5-S1 extended to far lateral right articular and extra-articular region, was performed with a high-speed drill and a rongeur. The enlarged intervertebral foramen was opened with a rongeur by magnification of microscope, until the tumor was sufficiently exposed. The dura was opened, the tumor was not attached to the dura or arachnoid and an internal debulking of the tumor was performed, valuating intraoperatively the anatomical tight adhesion of pathological tissue with surrounding structures, without a complete cleavage plan. We proceeded in a medial to lateral direction, starting from spinal canal to nerve foramen, through a complete microneurosurgical drilling of omolateral segmental L5-S1 articular complex, continuing far-laterally towards extra-articular ganglionic region, dissecting nerve root without significant alteration of neurophysiological monitoring pattern. During the dissection, in particular from the foraminal region to far-lateral paravertebral region we did not see a clear cleavage plan between lesion and surrounding structures and so we chose to proceed through intracapsular (subtotal) debulking, ensuring to obtain representative samples of pathological tissue.

The tumor was dissected free from the nerve root, that was anatomically and functionally preserved. Finally, we closed the dura in a watertight fashion using fibrin glue and fat harvested from subcutaneous tissue.



Results

Patient recovered upright posture and walking during the first postoperative day, showing since the immediate post-operative period a significant reduction in pre-operative symptoms (in particular pain and associated motor

leg function limitation), with the aid of a lumbar corset. The surgical wound was always regular and subfascial lumbar drainage was removed on the first postoperative day. During postoperative recovery no additional neurological deficits appear and the low back pain and the right sciatic pain progressively and partially improved. The primary wound healing process, during recovery, has always been regular, with no signs of CSF collection/fistula. On the fifth

postoperative day patient was regularly discharged from the hospital with the indications to wait for the histological examination result (WHO Grade I

meningioma, fibroblastic subtype) for any possible subsequent therapeutic (adjuvant) protocol and for the appropriate follow-up.

Fig 2. Histopathological and immunohistochemical evaluation:

WHO I, fibroblastic subtype, meningioma.

Mitotic Index < 1/10 HPF (x400) – MIB 1/Ki67 < 4%; positivity for estrogen and progesterone receptors; negativity for EMA, CD34, CD31, CAM 5.2, ACTIN alpha, S100.

Discussion

Intraspinal meningiomas usually occur in the spinal canal and do not extend through the intervertebral foramen [1]. Most spinal meningiomas arise in the thoracic region; we have not found an explanation as to why meningiomas prefer the thoracic spine, but it seems that the cause is due to the arrangement of the dentate ligaments there [11]. Only few reports mention the spinal dumbbell meningioma [1,2,4,5,7,9] and to our knowledge, based on a search of the literature, we have found only one case of lumbar dumbbell meningioma as reported by Akio Iwanami et al [5].

McCormick [9] reported dumbbell-shaped tumors with significant intraspinal and paravertebral involvement and also classified them into four types, based on the location of tumor: intramedullary, intradural extramedullary, epidural, and dumbbell.

Meningiomas arise from the cellular elements of the arachnoid. The cauda equina does not contain such cellular elements, except in the nerve root sleeve. Jun Mizutani et al . [4] claim that meningiomas occur in the thoracic or cervical region and that they in the lumbosacral region are especially rare. Myeong-Soo Kim et al [1] describe a dumbbell-shaped Meningioma in thoracic spine and they support that the tumor probably originates from the arachnoid villi at the nerve root exits. Because there is little intraspinal space for tumor growth, a meningioma at this location is prone to grow through the dura and, subsequently, to the extradural/extravertebral space. They also considered the tumor might have arisen from the arachnoid villi at the nerve root exits, because it was adhered tightly to the intervertebral foramen's posterior wall (posterior wall of intervertebral foramen). Thomas et al [11] reported the possibility that such tumors arise from the nerve root sleeve, which contains cellular elements of the arachnoid. Bain and Shnitka [10] in their publication indicate that the Schwann cell and the arachnoidal lining cell are close histogenetic relatives, both being of neuro-ectodermal origin. Tumors originating from Schwann cells might therefore be expected occasionally to reproduce meningeal structures.

In our case, the tumor was easily separated from the dura during surgery. Exactly why meningioma involving the cauda equina displays characteristics of easy separation is uncertain, but one possible explanation is migration of cellular elements during prenatal development as supported by Jun Mizutani et al [4] or that these tumors may arise from the arachnoid cells of the root sleeve. The root sleeve is

a transition site from the spinal canal to the intervertebral foramen as Akio Iwanami et al supported [5] and we share the first hypothesis.

Conclusion

This case report suggests that an extra-axial spinal lesion, involving at lumbar level one nervous cauda equina root, should be planned including the possibility to result histologically a meningeal tumor, and not only a peripheral schwannoma/neuro fibroma. In this way surgical strategy and in general diagnostic-therapeutic planning could include some important tips and tricks in the development of the patient treatment protocol. During surgery for lumbosacral intraspinal tumor, it is necessary to consider a diagnosis of meningioma,

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