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Dumbbell Meningioma of The Thoracic Spine Resected by Combined Posterior and Thoracoscopic Approach

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Spinal meningiomas are relatively common neoplasms of the central nervous system but asymptomatic thoracic dumbbell meningioma is rare. We report a case of 45-year-old-female who presented asymptomatic spinal mass, diagnosed while general physical examination. There was history of treated pulmonary tuberculosis several years back. There was café-au-lait spot noted. Magnetic resonance imaging (MRI) revealed a thoracic mass at the level T9-10 with extension into thoracic cavity. Complete resection of spinal mass was done through minimally invasive combined approach. The histopathological examination revealed meningioma. Follow up examination with MRI of the brain and spinal cord in a patient with neurofibromatosis type 1 should be performed to detect the recurrent tumors at these sites.

Key Words: dumbbell tumor, intraspinal tumor, meningioma, thoracic region

Meningioma is a slow growing, extra-axial tumor, usually benign, arising from arachnoid[7]. Dumbbell meningioma has an intraspinal and a paraspinal component connected through the corresponding intervertebral foramens and associated with foraminal widening. The extraspinal extension part is usually larger than the intraspinal part. However, the intraspinal component commonly causes the typical symptoms: local pain and symptoms from spinal cord compression in the thoracic spine. Schwannomas and neurofibromas are the most common dumbbell lesions[10] but meningiomas are rare. We report a rare case of an asymptomatic dumbbell meningioma at the T9-10 level which was removed by using combined approach- posterior midline with laminectomy and thoracoscopic procedure and review the literature.

Case Report

A 45-year-old right handed female, non hypertensive, non diabetic presented with left chest spinal mass which was noticed during a medical checkup. Her vital parameters were within normal limits and had no neurological deficits. Café-au-lait spot was noted. The computed tomography (CT) of the chest showed left spinal mass at T9-10th level **(figure 1)**. The magnetic resonance imaging (MRI) of the thoracic spine disclosed pathological mass with intra-dural extramedullary expansion dumbbell tumor at the T9/10 level measuring 6.85 cm x 8.11 cm x 6.64 cm in dimension with a smaller intraspinal part, connected through a widened intervertebral foramen with a larger extraspinal part on the left side **(figure 2)**. The MRI examination led to a suspicion of a schwannoma. The von Recklinghausen disease (Neurofibromatosis type 1) was diagnosed. After admission, T9/10 laminectomy was performed by a posterior midline approach in the right lateral position. When the dura was opened, a pinkish, firm, hypervascular tumor was noted at the left side of the spinal canal, with the spinal cord displaced to the right. Under the operating microscope, internal debulking of the intraspinal tumour was performed; and the intraspinal tumour was circumferentially detached from the dura and completely resected up to the neuroforamen. Thoracoscopic surgery was performed using 3 ports. The dumbbell tumor with its capsule was circumferentially detached from the pleura by blunt dissection **(Figure 3)**. A piecemeal excision has been performed to easy pull through the thoracoscopic poles

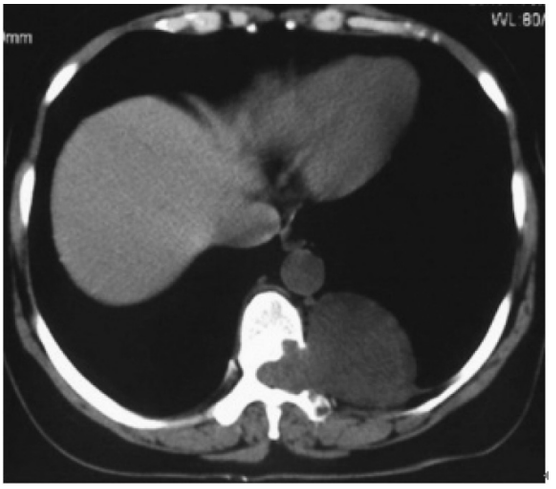

Figure 1: Chest CT scan demonstrates dumbbell tumor at the T9/10th thoracic vertebral level on the left side.

after resection. Dura was closed in a watertight fashion and the wound was sutured in a standard fashion over a suction drain. Histological analysis confirmed the diagnosis of a meningioma **(Figure 4)**. Patient had a smooth recovery with no obvious neurological deficit after the surgery. He refused to perform post operative MRI as financial reason. The patient was discharged following a good outcome.

Discussion

Meningioma is one of the most common clinical entities in everydayÊneurosurgicalÊpractice. In 1888, Sir Victor Horsley and Sir William Gowers were the pioneers to successfully resect a thoracic meningioma.[6] Initially they described their spinal tumor as fibromyxoma. However, in 1922, Harvey Cushing coined the term "meningioma" to describe this frequently benign and globular tumor arising from the meninges. [6] This term has since gained widespread acceptance. It is the second most common tumor of the spine, accounting for nearly 25% of such masses. 1 It occurs nearly four times as often in males as in females and the peak period of occurrence is in the fourth and seventh decades of life. The most common site of occurrence is the thoracic spine (82%), followed by the cervical spine (15%) and rarely occurs in the lumbosacral spine (2%). Approximately 90% of spinal meningiomas are intradural, with about 5% extradural and the remaining a combination of both intra and extradural. [7] Sixty eight percent occur laterally to the spinal cord, eighteen percent are posterior, and fifteen are percent anterior. However, they may become symptomatic as they progressively enlarge and interfere with adjacent neural structures.[7] The most important diagnostic tools are computed tomography (CT) and Magnetic resonance imaging (MRI). Diagnosis is best established by MRI with or without contrast agent injection.

Dumbbell thoracic meningioma originates from the arachnoid membrane that passes through the corresponding intervertebral foramen and leads to the so-called dumbbell lesion, having enlarged foramen. Schwannomas and

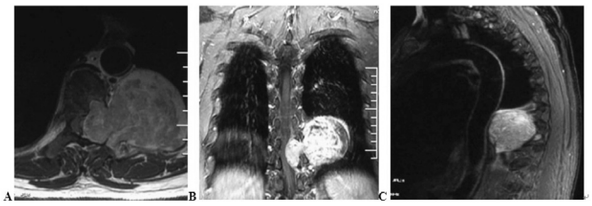

Figure 2: MRI axial (A), Coronal (B) and sagittal (C) sections of thoracic spine showing dumbbell tumor at T9/10 and paramedian extension into the left side. The tumor compresses the spinal cord anterolaterally towards the right side.

neurofibromas are the most common but conjoined nerve roots, root sleeve cysts, ganglion cysts, foraminal disc herniations, ependymomas, vertebral chordomas , meningiomas, ganglioneuromas, lipoma, absence of vertebral pedicle, aneurysm, looping or tortuosity of the vertebral artery may produce such lesion. [10] To our best knowledge, ten patients were found to have dumbbell meningiomas in the literatures **(Table 1)**.[1, 2, 4, 5, 8, 9, 11, 12, 14].

Among these ten patients, six were female and four were male and also six were younger than thirty five. Neurofibromatosis type 1 (NF1) was suspected in one patient who was sixteen years old [14] and neurofibromatosis type 2 (NF2) was diagnosed in two patients. [1, 5] Five patients had tumors in the thoracic spine, two in the cervico-thoracic junction, and three in the cervical spine. Eight tumors were benign meningiomas, and one tumor was atypical and one was a malignant meningioma. Three patients had previous surgery for the intraspinal meningiomas, and the tumors recurred to become dumbbell. [8, 9] The clinical features of these patients suggested that younger age previous operation for intraspinal meningioma and neurofibromatosis were most likely contributing factors in the development of dumbbell meningioma. [1, 5, 8, 9, 14] Meningiomas in female are more often associated with neurofibromatosis[1, 5, 14], which was proven in our case too.

The goal of surgery is to obtain complete surgical resection of these relatively benign thoracic dumbbell tumors to provide cure without postoperative deficits and recurrence. Surgery is challenging as these lesions are often deeply situated, in close proximity to important vascular structures and organs like lung, heart and descending aorta. When a thoracic approach alone is applied, resection of a spinal part may be difficult. An intraspinal procedure should be performed to avoid spinal cord damage, followed by complete thoracoscopic resection of the residual tumor so as to open the intervertebral foramen. In the literatures, there are different surgical approaches to thoracic dumbbell tumours which can be removed using a single posterior approach with posterolateral extension or using a combined posterior and transthoracic approach via separate incisions or a single laterally curved incision. [3, 8, 13] But in our case, we performed thorough combined posterior and thoracoscopic approach even for a large sized meningioma, which is known to have favorable outcomes in the incidences of postoperative complications such as pain, duration of hospital stay after surgery and operation time.

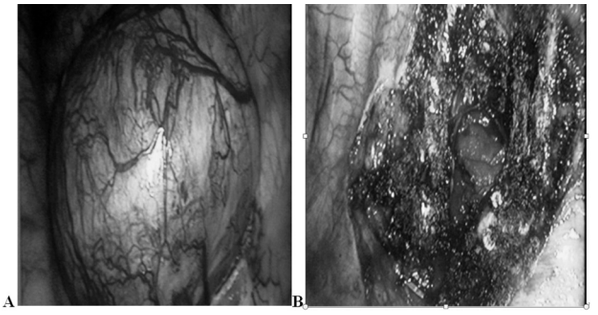

Figure 3: (A) Thoracoscopic findings show a Giant intrathoracic tumor and (B) site of tumor after resection.

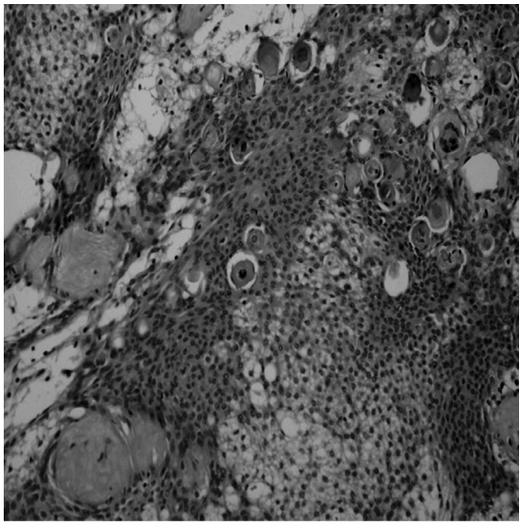

Figure 4: Photomicrograph showing a meningioma composed of nests of tumor cells among prominent fibrous stroma (H & E staining; original magnification x 200)

Conclusions

The multidisciplinary team of neurosurgeons and cardiothoracic surgeons successfully treated patient with rare giant dumbbell meningioma via combined posterior spinal and thoracoscopic approach. Total tumor removal was achieved with favorable functional recovery. We believe that multidisciplinary collaboration is essential for one-stage total resection of thoracic dumbbell meningioma with a fruitful outcome.

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