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Case Report

Perineural spread of malignant mesothelioma with spinal intramedullary involvement☆

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1. Introduction

Malignant pleural mesothelioma is an uncommon but aggressive malignancy. Its incidence is approximately 1.05 per 100,000 persons in the United States, with an estimated 3200 new cases annually. Even with multimodal treatment, most commonly pemetrexed-based chemotherapy, median survival is approximately one year after diagnosis, and cure is exceedingly rare. Most patients are found to have an epithelioid histology, which is associated with a prolonged survival as compared with the sarcomatoid, biphasic, and desmoplastic types. Patterns of failure after chemotherapy and surgery are predominantly local, and mesothelioma frequently demonstrates localized direct invasion and lymphatic spread in the thorax. However, there are very few reports of spinal cord involvement. The mechanism of spread includes direct extension or hematogenous or perineural spread. Perineural spread is extremely rare, and to the best of our knowledge, only seven cases have been reported previously [1–7] (Table 1). We report a case of malignant pleural mesothelioma, which demonstrated retrograde perineural spread along an intercostal nerve to involve the spinal cord, with a review of existing literature.

2. Case report

A 76-year-old man initially started having complaints of left shoulder pain 10 months ago, and was found to have a rotator cuff tear, which was also confirmed on MRI shoulder. He also felt pain in his left anterior chest and lower posterior chest. Evaluation with CT demonstrated multi-lobulated pleural-based masses throughout left hemithorax involving both medial and lateral surfaces, which were confirmed to be malignant mesothelioma with mixed epithelial and sarcomatoid histology on pathologic examination. Based on his age, extensive disease with infiltration through diaphragm into the intra-abdominal fat adjacent to the spleen, and his history of heart disease, especially past CABG; he was not considered a surgical candidate. He was treated with chemotherapy with pemetrexed and carboplatin for six cycles with partial response, followed by maintenance pemetrexed. Reimaging after two cycles of maintenance therapy revealed stable disease. Shortly thereafter, he then developed recurrence of his left chest wall pain. Reimaging the

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Table 1
Review of previous cases who presented with perineural spinal intramedullary involvement.

Authors (Year)	Age (yrs)	Sex	Nerve root(s) involved	Presentation/Interval between MM diagnosis and spinal metastases	Imaging findings/Histology	Therapeutic intervention	Treatment response	Post presentation survival
Cooper [6]	67	M	Several nerve roots in T8 region	Paraplegia, urinary incontinence, shoulder pain/NA	Autopsy-nodular dural & nerve roots thickening, deposits within spinal cord substance/Biphasic	NA	NA	NA
Steel et al. [1]	54	M	T1	Brown-Sequard syndrome, Horner's syndrome, thoracic sensory level/3 years	Enhancing material coating & infiltrating spinal cord/Epithelioid-Bisphasic	Presence of a clean plane for dissection, total resection	Improved sensation, lower-extremity function	NA
Lee et al. [7]	55	F	T9	Thoracic & lumbar pain, paraparesis, LE hypertonia & hyperreflexia + Babinski, sensory level/18 months	Soft tissue extension into neural foramina, spinal cord compression/NA	NA	NA	NA
Hillard et al. [2]	61	M	C8-T1	Upper & lower extremity weakness, Horner's syndrome, decreased sensations, up-going toes/2 years	Soft tissue extension into neural foramina, epidural extension, spinal cord enhancement, expansion with central edema/Epithelioid	Partial resection, followed by radiation therapy	Improvement in strength	NA
Payer and von Briel [5]	50	M	T4	Chest pain, partial Brown-Sequard syndrome increased DTR, tactile hypesthesia, and sphincter disturbance/28 months	Enhancing vertebral mass extending through intervertebral foramen into spinal cord, diffuse intramedullary signal/Sarcomatoid	Absence of a clean plane, subtotal resection	Chest pain reduction, no neurological change	6 months
Okura et al. [4]	61	M	T4	Paraparesis, LE numbness + Babinski, micturition & defecation dysfunction, sensory level/7 months	Enhancing spinal cord mass, extensive perifocal edema/Sarcomatoid	Absence of a clean plane, subtotal resection	Neurological condition unchanged, slight sensation improvement	3 months
Richter et al. [3]	64	M	T1–T2	Chest pain, upper extremity pain, weakness, worsening gait, spastic paraparesis/At the same time	Paraspinal tumor infiltrating into foramen, myelopathy with spinal cord edema and tethering/Desmoplastic	Partial resection, followed by radiation therapy	Immediate post-op spastic paraparesis aggravation, back to pre-op activity with physiotherapy	NA
Present case	76	M	T6	Lower extremity weakness, numbness/10 months	Pleural mass invading paraspinous soft tissues, ribs, posterior chest wall. Soft tissue abnormality extending along T6 nerve & nerve roots, extramedullary mass, enhancing spinal cord mass with edema/Mixed epithelial and sarcomatoid	Fractionated radiation therapy	Improvement in strength and sensation, reduced pain	1.7 months

Abbreviations: DTR, deep tendon reflex; LE, lower extremity; MM, malignant mesothelioma; NA, not available.