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Intramedullary Spinal Cord Metastasis in a Patient with Breast Cancer: A Case Report

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ABSTRACT

This 67-year-old patient with breast carcinoma in medical history presented a progressive limitation of superficial and deep sensation below the L4 dermatome, paresis in sole flexion of the left foot, paralysis in flexion of the right foot of a month evolution. The day before admission, urinary retention and abdominal pain occurred. An MRI image (performed privately due to increasing numbness of the lower limbs) revealed a tumour within the spinal cord between the Th12 and L1 vertebral bodies. Postoperatively, improvement in the previous neurological deficit was observed. Tissues obtained during surgery confirmed that it was histopathological low differentiated carcinoma. Metastasis at this level is rare and present less than 6% of all spinal metastases. Most likely, the intramedullar spinal cord lesions are a metastasis of breast cancer.

Keywords: Intramedullary Spinal Cord Metastasis, Metastasis, Breast Cancer, Spinal Cord

INTRODUCTION

Intramedullary Spinal Cord Metastasis (ISCM) are rare complications of cancer (0.1-6% of patients) (Mechtler, 2013; Lv, 2019; Basaran, 2014). However, in contrast to primary spinal cord tumours nowadays they show increasing incidence. Mostly because of advancement made in chemotherapy protocols and surgery therapy of primary cancers, and better diagnostic methods such as (Magnetic Resonance Imaging (MRI). MRI is now considered as the gold standard for the diagnosis of spinal cord tumours (Connolly, 1996; Gasser, 2001). The typical ISCM visualization on MRI is a small, isolated, oval-shaped lesion with or without slight deformation of the spinal cord profile. It is isointense on spin-echo T1 weighted images with a nodular contrast enhancement and pencil shaped hyperintensity on T2-weightes sequences, most frequently extending proximal to the lesion (Castro, 1997). The use of intravenous gadolinium is helpful in demonstrating the typical enhancing central lesion with surrounding T2-weighted signal abnormality pre-sumed to be edema (Fredricks, 1989; Ibrahim, 2021; Mostardi, 2014). ISCMs typically occur in the sixth decade of life, usually 11.9-38 months after primary diagnosis, and have a poor prognosis with a mortality rate after 3-4 months of 80% and a median survival of only 3-11.6 months (Lapolla, 2021). It accounts only 0.85-3.9% of symptomatic metastatic tumors affecting the spinal cord and is found in only 2% of postmortem sections. Breast cancer (11-26%) is the most common cause of spinal metastases after lung cancer (45-54%) (Wewel, 2020) Patients with primary breast cancer have a better prognosis than those with ISCM of other origins. Intramedullary tumours usually cause swelling, distortion and compression of the spinal cord parenchyma, resulting in pain and sensory and motor disturbances and sphincter dysfunction (Ruppert, 2017). Optimistic prognostic factor is patient's general good condition, if it is stable, we can expect relieve in neurology deficiency caused by medullary mass. It rises a hope to oncology patients, as happened in our case.

CASE REPORT

A 67-year-old female was admitted with a progressive worsening of lower limb paresis and sensory disturbances of the perineal region. One month prior to admission, the patient had noticed difficulty in walking and sensory disturbances of the legs, which she reported to her general practitioner doctor. The complaints had increased significantly in the approximately two weeks before admission and include reduced superficial and deep sensation below the L4 dermatome, paresis in sole flexion of the left foot and inflexion of the right foot. The day before hospital admission urinary retention and abdominal pain occurred. These symptoms were associated with a dull aching pain in her midback and numbness in lower extremities. The MRI revealed a tumour within the lumbar intumescence of the spinal cord at the level of the border of the Th12 and L1 vertebrae (Figure 1, 2, 3, 4).

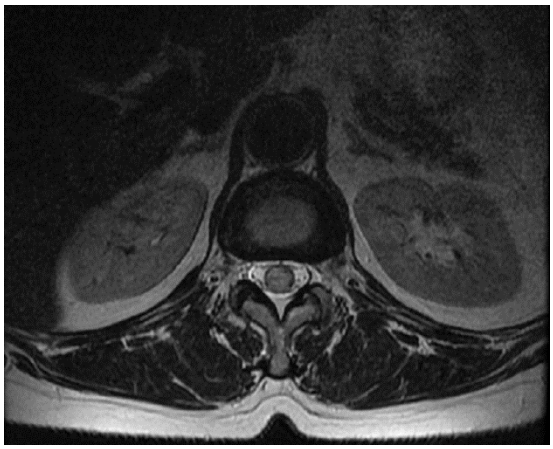

Figure 1. MRI image showing intraspinal metastasis of breast cancer to the spinal cord-axial view

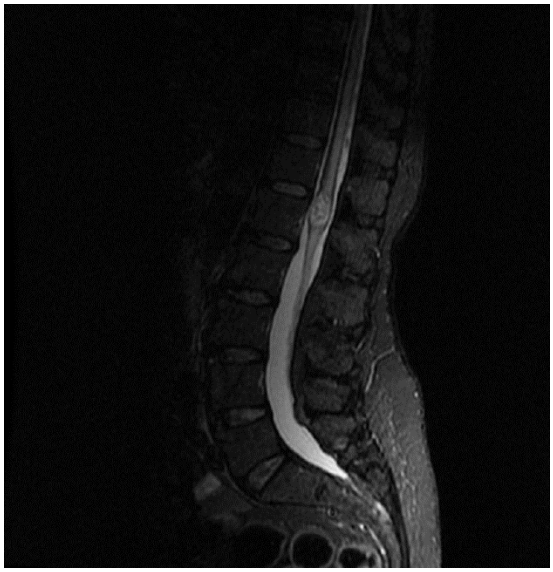

Figure 2. T2-weighted MRI image showing intraspinal metastasis of breast cancer to the spinal cord at Th12-L1 level – sagittal view

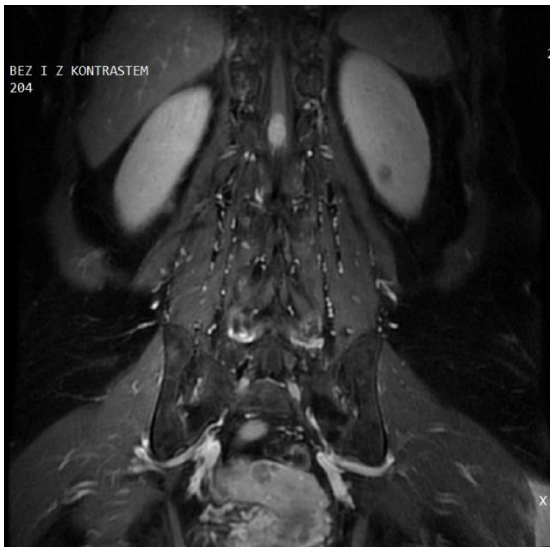

Figure 3. MRI image showing intramedullary metastasis of breast cancer to the spinal cord at Th12-L1 level – sagittal view

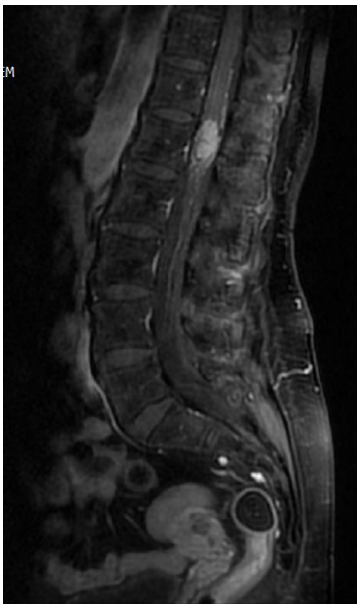

Figure 4. T1-weighted MRI image showing intramedullary metastasis of breast cancer to the spinal cord at Th12-L1 level – frontal view

The patient had a known history of cancer – left breast tumour after mastectomy, with chemotherapy, and sentinel node excision a year earlier. At the time of initial presentation there was already evidence of metastasis to the chest.

The tumour profile was consisted with minimally positive estrogen receptor (ER) and HER-2/neu receptor. The histological picture based on the immunohistochemical findings was consistent with metastatic low-differentiated carcinoma. Most likely, the medullary lesion was a metastasis of breast cancer. The initial medical therapy consisted of a doxorubicin, cyclophosphamide, and doxacel regiment with a partial response. Neurologic examination revealed numbness and reduces motor strength in both lower limbs. There were no pathologic reflexes. During hospitalization, the patient received glucocorticosteroids (Dexamethasone -4x4/d for the first 10 days, then 4+2 mg/d for the next 8 days), non-steroidal anti-inflammatory drugs (NSAID) (Ketoprofen 100 mg 2 times a day, Metamizole 1 g 3 times a day and 100 ml NaCl once a day for the first 10 days of hospitalisation) and, to prevent gastric and duodenal ulcers associated with NSAID intake, proton pump inhibitors (Omeprazole 20 mg once a day). Low-molecular-weight heparin (Dalteparin 5,000 units subcutaneously once a day) was used as thromboprophylaxis associated with surgery.

Surgical treatment included removal of the spinal tumour, through the following procedures: skin incision in the Th-L region, laminectomies, durotomy, and myelotomy. After dissection of the posterior medial fissure, the tumour was visualised and dissected laterally from the spinal cord. Macroscopically, the tumour was removed in its entirety using CUSH bipolar forceps. Multiple motor evoked potentials (MEP) records check during removal – no abnormalities – no spikes in amplitude were noted. TOF monitoring (muscle relaxation control) were also measured. Then it was followed by haemostasis, surgiflo, meningeal sutures and duraplasty. Postoperative course uncomplicated, no neurological deterioration immediately after surgery. The patient was actively rehabilitated. The patient was verticalised and trial bladder stimulation was performed. The postoperative period was uncomplicated, improvement in the previous neurological deficit (her paresis and sphincter control improved), significant pain relief was observed. Although, due to poor differentiation the histopathology did not unambiguously confirm the breast cancer metastasis, based on medical history it was assumed that this was the case.

Psychological history: Oncologically burdened patient, emotionally stable, with depressed mood and sleep difficulties for a year (patient takes half a tablet "for sleep" daily). Supportive dialogue, psychoeducation, and cognitive reinterpretation were performed. Observation of emotional condition and modification of sleep medication was recommended.

The patient was in good condition and transferred to the Rehabilitation Department of the Polyclinic in Zielona Góra for further treatment.

DISCUSSION

Spinal cord compression is the second most common neurologic complication of uncontrolled cancer after brain metastases (Mendez, 2018). It has been well documented that majority of spinal cord metastases arises in the epidural or extradural space (Ziu, 2022). Primary intramedullary spinal cord tumours are uncommon, the represent less than 5% of all spinal cord malignancies (Das, 2022; Samartzis, 2015; Samartzis, 2016). Most of them are of neuroectodermal origin – more than 50% are astrocytomas and ependymomas (Villegas, 2004).

Intraspinal metastases typically occur in the sixth decade of life (Sung, 2013; Goyal, 2019; Kalayci, 2004; Mackel, 2020), usually 11.9-38 months after primary diagnosis (Lv, 2019; Rykken, 2013; Schiff, 1996; Sung, 2013; kalayci, 2004; Mackel, 2020), although it can happen even after 22 years predisposed by the presence of the ER+ hormone receptor, which delays the process (Rostami, 2013; Mackel, 2020).

MRI is the primary test to detect medulloblastoma (Basaran, 2014). The tumour on T1-dependent imaging is seen as an isodense lesion, while T2-weighted imaging shows a hyperintense mass with extensive oedema surrounding it (Figure 1, 2, 3). If hemorrhages occur they may be accompanied by heterogeneous image enhancement (Mechtler, 2013; Hsu, 2013; Rykken, 2013; Kalayci, 2004; Mackel, 2020).

There are 3 main treatment modalities for ISCM-radiotherapy, chemotherapy and microsurgical resection of the focal intramedullary tumour (Mechtler, 2013; Hsu, 2013). Radiotherapy remains the treatment of the first choice in radiation-sensitive metastases such as those from small-cell lung cancer, breast cancer or lymphoma. However, for rapidly progressive deficits or those lasting up to 48 hours, urgent radical resection of the ISCM should be the treatment of choice. Chemotherapy can be used in combination with radiotherapy or surgery in some chemotherapy-sensitive cancers, such as small cell carcinoma and haematological malignancies. Metastases from breast cancer have a good prognosis (Lee, 2007). In addition, metastases are extra-axial tumours, i.e., they grow expansively rather than infiltrate, so they are fairly well demarcated and can be relatively easily debrided and removed. The patient's case demonstrates the benefits of the surgical approach due to the improvement in neurological deficits and a significant reduction in pain.

To maximize the effectiveness of resection of intraspinal tumours, intraoperative electro-physiological monitoring by somatosensory and motor evoked potentials is helpful. MEP monitoring provides the most valuable information (Costa, 2007). It has been found that both preoperative MEP results and those obtained during surgery correlate strongly with the patient's clinical condition (Sala, 2007). When there is a significant decrease in MEP amplitude (less than 50% of the initial values), further manipulation should be discontinued (Sala, 2007).

The patient described here underwent tumour resection under MEP and TOF control due to reduced superficial and deep sensation of the left foot, paralysis in flexion of the right foot and also urinary retention. In addition, the patient was in stable condition and the intraspinal tumour was solid and did not occupy the meninges, making it easily accessible for surgical removal. The symptoms improved after surgery.

SHORT CONCLUSION

A myelopathy that arises during the malignancy course is often caused by compression of the spinal cord by metastatic tumour. The clinical manifestations of metastatic intramedullary spinal cord tumours are typically back pain, paraparesis, paresthesia, spasticity of lower limbs and autonomics dysfunctions. Close to 1/3 of patients with ISCM, neurologic deficits are the first symptoms of underlying systematic malignancy (Schiff, 1996; Chason, 1963). Intramedullary spinal cord metastasis can produce edema, distortion and compression of the spinal cord parenchyma, resulting in signs and symptoms that are similar to epidurial spinal cord compression. It is almost impossible to reliability distinguish these two conditions without radiographic imaging. However, asymmetric presentation of motor deficit or sensory disturbance in lower limbs pronounced more in favore of ISCM. Epidurial metastases tend to be more symmetrical. Some ISCM may also ocure in form of Brown-Sequard syndrome, defined as unilateral spasticity and weakness with contrateral loss of temperature and pain sensations. Moreover, primary tumorse in contrary to ISCM typically are slower in progression. The treatment options for ISCM are radiotherapy, chemotherapy and microsurgical resection of the

focal intramedullary tumour. The current standard of care is radiotherapy (especially among patients with established deficits). That is mainly due to surgeons' fear of surgical treatment of a patient with metastases. However, the method of choice for rapidly progressive deficits or those lasting up to 48 h should be urgent radical resection of the ISCM. Chemotherapy may be used in combination with radiotherapy or surgery in some chemotherapy-sensitive cancers such as small cell carcinoma and hematological malignancies. Metastases from breast cancer have a good prognosis. Moreover, metastases are tumours of the extra-axial type, i.e., they grow expansively, not infiltratively so that they are well-demarcated and can be dissected and removed relatively easily. The patient's case demonstrates the advantages of the surgical approach because of the improvement in neurological deficits and significant pain relief.

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