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Case Report

Intramedullary spinal cord tumor presenting as the initial manifestation of metastatic colon cancer: case report and review of the literature

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Study design: Case reports and review of the literature.
Objective: Intramedullary spinal cord metastases (ISCMs) are rare type of central nervous system (CNS) involvement of systemic malignant tumors. Since the advent of new neuroradiological techniques, their detection have become increasingly diagnosed in recent years and, although somewhat controversial, surgical treatment has been considered a valid option.
Setting: Neurosurgical Clinic, Department of Clinic Neuroscience, University of Palermo, Italy.
Method: The authors describe the case of a 61-year-old woman who was admitted presenting with progressive tetraplegia. Investigations revealed an intramedullary spinal cord lesion at the cervical level. Magnetic resonance imaging of the brain did not reveal other CNS metastatic lesions.
Result: Patient underwent surgical treatment. The tumor was resected and the patient's neurologic deficits slowly improved. Histological examination of the lesion showed the typical features of a colon carcinoma metastasis. Patient was referred for proper oncological treatment but, unfortunately, she died of disseminated disease within 2 months.
Conclusion: Although uncommon, spinal cord metastases should be considered in the differential diagnosis of ISCM in order to rationalize the decisional-making process and improve the quality of life for these patients.
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Keywords: adenocarcinoma; intramedullary tumor; metastasis

Introduction

Intramedullary spinal cord metastases (ISCMs) are rare occurrences representing 8.5% of central nervous system (CNS) metastases.[1] They affect 0.1–0.4% of all cancer patients and comprise 1–3% of all intramedullary spinal cord neoplasms.[2,3] Basically, ISCMs arise from primary lung cancer, being the small cell carcinoma the most common neoplasm, with the remainder originating from primary cancers of the breast, kidney, and from melanomas or lymphomas.[4] To date, colon carcinoma-related metastasis is extremely rare with only few cases reported in the literature.[4–12]

We report on a patient with an intramedullary metastasis as first presentation of a colon carcinoma without intracranial involvement. Total resection of the tumor led the asymptomatic tumor to be diagnosed and brought the patient 2 months of useful life. The clinical features and the role of surgical treatment, along with the review of the literature, are presented.

Case report

History and examination

This 61-year-old woman had the insidious onset of numbness of the entire right hemibody below the clavicle and weakness of the upper and lower extremities, without pain or sphincter dysfunction.

Patient underwent magnetic resonance imaging (MRI) of the spine, which showed a solitary 2-cm mass occupying almost the entire spinal cord at C3–C4 level. The lesion appeared slightly hyperintense on T1- and T2-weighted images, enhancing heterogeneously with intravenous contrast (Figure 1). At presentation to our

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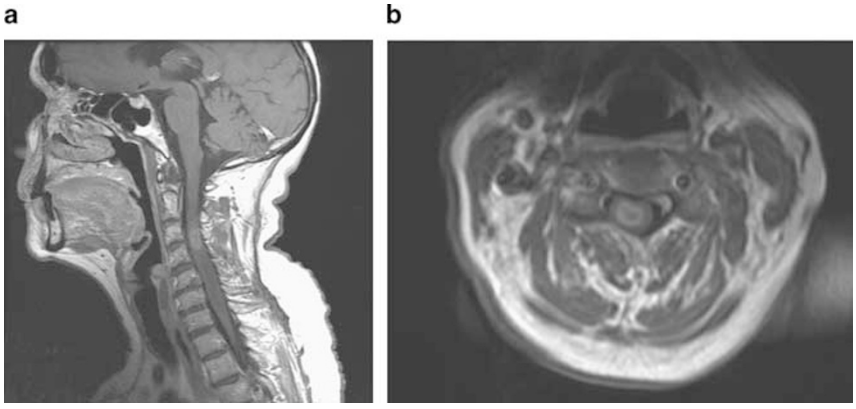

Figure 1 MRI scan of the cervical spinal cord: sagittal (**a**) and axial (**b**) gadolinium MRI of the cervical spine showing a solitary mass in the intramedullary cervical spinal cord at C3–C4 level. The lesion showed a heterogeneous enhancement following intravenous administration of gadolinium contrast

Institution, the patient denied pain, fever, weight loss, visual symptoms, or a family history of malignancy.

At neurological examination, she had a spastic bilateral hemiparesis and was diffusely hyper-reflexic, with upgoing toes bilaterally. Sensory examination showed absence of pain and temperature sense below the clavicle, with preserved sense of discriminatory touch. General physical examination was almost negative. Based on the progressive neurological worsening, surgical treatment was performed.

Operation

Patient underwent C3–C4 laminectomy accomplished via a posterior approach. At operation, the dura appeared to be intact. Once exposed, the spinal cord appeared normal on the surface. After a midline myelotomy was performed, the tumor was discovered. It was red in color with a pseudocapsule distinguishing it from the surrounding spinal cord. The lesion was sharply dissected out and completely removed.

On histological examination, the lesion showed the pathological features of adenocarcinoma metastasis from a colon cancer (Figure 2).

Postoperative course

The immediate postoperative course was uneventful. The patient progressively showed remarkable neurological recovery and was referred to the oncological department for stadiation of the primary tumor and proper treatment. Unfortunately, she died of disseminated disease within 2 months.

Discussion

ISCMs are uncommon neoplastic lesions and account for 3–5% of cases of myelopathy in patients affected by cancer.[13,14] In the literature, lung cancer, especially small cell carcinoma, accounts for a majority of cases followed by breast cancer, melanoma, lymphoma, and

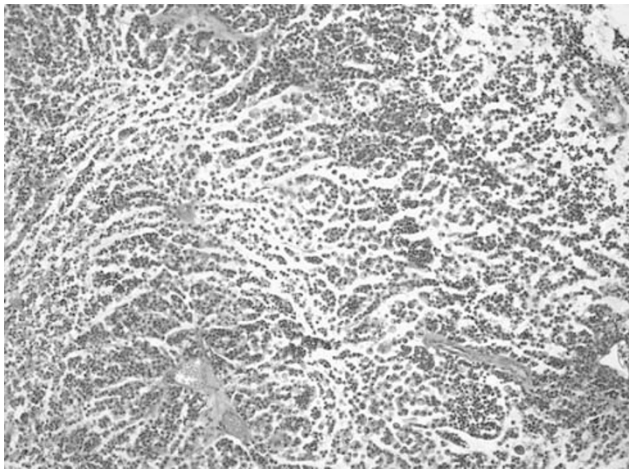

Figure 2 Photomicrograph of the spinal cord lesion showing a colon cancer metastasis (H&E stain, $\times 20$)

renal cell carcinoma.[15,16] Colon carcinoma-related metastasis is extremely rare and only few cases have been reported, so far, in the literature.[4–12] Table 1 summarizes the principal findings of these cases.

Our report describes a unique case in which a patient, without previous history of cancer, presented with a lesion of the cervical tract of the spinal cord proven a metastasis from colon carcinoma. In such a case, the spinal cord lesion was the first clinical evidence of the primary tumor. Although the surgical treatment provided an initial neurological restoration, the patient died of disseminated disease within few weeks. In this regard, it is well known that a majority of patients with ISCM are known to have brain metastases and systemic metastasis at the time of diagnosis.[17] Furthermore, intramedullary localization is associated with a very short life expectancy with a median survival of 3–4 months from the time of the diagnosis.[4,18]

A controversial issue regarding the natural history of CNS metastases is the discrepancy between spinal cord and brain localization being the latter more frequently

Table 1 Review of case reports of patients with IMSC colon cancer metastasis

Author	*Level*	*Initial presentation*	*Other CNS metastasis*	*Surgery*
Sansoy[9]	Thoracic	No	No	No
Silva and McSwain[10]	Cervical	No	No	Yes
Walker[11]	Lumbar	No	No	No
Jellinger *et al*[6]	Thoraco-lumbar	No	Yes	No
	Cervical	No	Yes	No
Foster *et al*[5]	Cervical	No	ND	Yes
Schiff and O'Neill[4]	ND	ND	ND	ND
	ND	ND	ND	ND
Ogino *et al*[8]	Cervical	No	No	Yes
Yano *et al*[12]	Thoracic	No	No	Yes
Kaya *et al*[7]	Thoracic	No	Yes	Yes
Present case	Cervical	Yes	No	Yes

ND, not described

reported. Intramedullary metastasis is rarely the unique site of CNS involvement since brain metastasis may be discovered concurrently or previously in most patients.[6,14,19] Such a discrepancy can be partially explained by a different mechanism of tumor spreading. Several theories have been postulated, including hematogenous dissemination through either the arterial supply to the spinal cord or retrograde spread from the venous system.[6] In this regard, it is well known that the brain receives about one-third of the cardiac output through large vessels under high pressure, while the spinal cord receives its arterial supply from small vessels under low pressure.[10,13] The medullary arteries arise from the aorta at right angles, while the cerebral arteries are almost a direct extension of the aorta, thus favoring embolic seeding.[20] Metastasis spreading may also occur through direct extension along nerve roots, perineural sheaths and via the CSF pathways.[6,21] However, hematogenous routes probably account for most ISCM. Finally, the known lower incidence of ISCM can attributed to the fact that the spinal cord is frequently omitted from routine autopsies and patients with widespread metastatic disease who experience neurological dysfunction may be treated without an extensive clinical and neuroradiological evaluation.[18]

Diagnosis of an intramedullary tumor can be difficult even when the primary tumor is known, because clinical findings do not help to distinguish ISCM from other spinal cord lesions. Such an occurrence should be considered when the patient, with a history of malignancy, presents with paresis or sensory impairments. It should be taken into account that a number of noncompressive myelopathies can occur in cancer patients with similar presentations. The differential diagnosis should include radiation myelopathy, paraneoplastic necrotizing myelopathy, and meningeal carcinomatosis.[6,22] Factors useful in making a diagnosis include pain on presentation, time course, and CSF cytology. Radiation myelopathy and necrotizing myelopathy typically do not present with pain.[22] The progression of neurological deficits is extremely rapid with ISCM, whereas it is more insidious for these other conditions. CSF findings in ISCM are usually negative or show only an increase in protein and a mild pleocytosis.[2,18,22] If positive, meningeal involvement may have occurred. Obviously, all of these factors are important but when a spinal lesion is suspected in a patient with a history of malignancy, MRI with gadolinium enhancement should be performed. In our case, although spinal cord MRI was performed at the beginning of the neurological involvement, there was no suspicion of ISCM because it was a solitary lesion and there were no other signs or symptoms of systemic malignancy.

ISCM management after diagnosis remains controversial since the current recommendations are based on anecdotal experiences described in retrospective reports. The standard therapy is radiation treatment, with or without steroids.[6,18,23] Efficacy of radiation therapy modality has been reported. However, this has been limited to patients in whom a very early diagnosis was made or who had radiosensitive tumors.[18,24] In these cases, radiotherapy has been demonstrated effective in improving both neurological symptoms and survival.[4]

Modern radiotherapy techniques, such as intensity-modulated radiation therapy, cyberknife, or tomotherapy can hold promise in efficacy, however, so far, no considerable data support their use. It must be noted, however, that only radiosensitive metastases, such as small cell carcinoma, breast cancer, or lymphoma respond to radiation therapy. Studies on the efficacy of chemotherapy are limited but show no effect on survival.[25]

To date, surgery for ISCM should considered in selected ISCM patients, especially those presenting with previously undiagnosed or limited primary tumors, since it may improve the length and quality of survival.[26,27] In these cases, radiotherapy and chemotherapy should follow the surgical treatment in order to maximize the treatment result. Several factors are important when considering surgical treatment such as patient's age, physical condition, location, and severity of the primary neoplasm, as well as other metastases, and surgical risks. It should be pointed out that surgical treatment is mainly limited by the fact that these neoplasms often tend to be present after the disease is widespread and life expectancy is short after diagnosis. Therefore, in these cases the optimal management is related to adjuvant chemo- and radiotherapy. Accordingly, surgical treatment should be considered when dealing with a radioresistant single metastasis, in the early stage of the diagnostic process, and in absence of multiple systemic metastases. In these cases, microsurgical removal of ISCM can improve the quality of life and provide a firm diagnosis in cases featuring our report in which the metastatic nature of the spinal cord lesion cannot be suspected.

Conclusion

ISCMs are rare but after the advent of MRI they are being encountered with increasing frequency. Colon adenocarcinoma metastases are rarely reported since only few cases are described in the literature.

Early diagnosis and microsurgical resection can result in improvement in neurological deficits and in the quality of life of patients with an ISCM.

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