Case report

Solitary intramedullary spinal cord metastases as the first signal of systemic cancer

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SUMMARY: *Solitary intramedullary spinal cord metastases (ISCM) are a very unusual complication in patients with systemic cancer. Their presence is verified at autopsy series in 0.9% to 2.1% of cases. We report a series of 3 patients whose underlying cancer remained undetected until they developed progressive paraparesis and sphincter deregulation due to a solitary intramedullary metastasis. Symptoms appeared one month prior to hospital admission in two patients, and 2 weeks before in the other. As the initial hypothesis was primary intramedullary tumours, surgical treatment was aimed at complete removal of these masses. Histological testing of the excised tumours and further investigation revealed that these were in actual fact metastases of primary tumours in the lung (two cases) and the breast (one case). Based on clinical findings in these three patients, whose intramedullary spinal cord metastasis was the first sign of the disease, surgical removal of the ISCM, together with prompt focal radiotherapy and treatment of the systemic malignancy results in a good quality of life during the course of illness and obviates complications due to immobilization. Although these considerations are drawn from a very small sample, they should be borne in mind if a patient with a systemic cancer and good general prognosis experiences neurological signs conditioned by an intramedullary mass.*

KEY WORDS: *Intramedullary spinal cord metastases, Myelopathy, Tumour.*

INTRODUCTION

Intramedullary spinal cord metastasis accounts for fewer than 5% of intramedullary tumours because of the small size of the spinal cord and its remote vascular accessibility to haematogenous tumour emboli. The lung and breast are the most common primary tumour sites even though gastrointestinal, renal, lymphoma and melanoma origins are also described[2-5,6].

Schiff and O'Neill, reporting their experience in the Mayo Clinic from 1980 to 1993, published one of the most significant cases of intramedullary metastases reported in literature in 1996[17]. They documented 9 patients who had ISCM as the first sign of cancer. In their series, however, the treatment was not standardized, and varied from corticosteroids to surgery and radiotherapy. Costigan et al., in a retrospective autopsy study of 627 patients with systemic cancer, detected 153 patients with central nervous system metastases, of which 13 manifested intramedullary spinal cord metastases. The frequency of ISCM was

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LIST OF ACRONYMS AND ABBREVIATIONS: ISCM = Intramedullary Spinal Cord Metastases; MRI = Magnetic Resonance Image.

8.5% of the central nervous system metastases and 2.1 of all cases of cancer[4]. Other reports describe episodic cases, usually in patients in whom the initial oncological illness was well documented. However, metastases are often multiple at clinical onset, and in these cases treatment should include radiation therapy of the entire medulla and specific chemotherapy[4,8,15].
It is likely that ISCMs are more common than generally believed, and their reported incidence is likely to rise due to the prolonged survival of cancer patients and the availability of ever more sensitive imaging techniques such as MRI. In particular, T2-weighted MRI images are extremely good at delineating intramedullary lesions such as tumours, and therefore enabling early diagnosis. Gadolinium is also helpful in evidencing the typical enhancing central lesion with a surrounding T2-weighted signal abnormality, presumed to be oedema[7,13]. Nevertheless, in a significant proportion of patients, the extent of the metastatic disease remains limited at the time of ISCM diagnosis, and these procedures could be useful for identifying a subset of patients who may benefit from aggressive treatment.
We report our experience with 3 patients affected by ISCM operated on at our Department over the last ten years.

□ CASE REPORTS

❒ Case 1

The first patient was a 45-year-old woman who developed progressive paraparesis and sphincter deregulation. Symptom onset was 3 weeks before hospital admission, where neurological examination revealed weakness and spasticity in both legs. Bilateral hyperreflexia and Babinski's sign were also present. A total sensory deficit was observed below the lumbar region. Spinal MRI showed a tumour at the first lumbar segment of the spinal cord (Figure 1). The patient underwent surgery (laminectomy, myelotomy and tumour resection) and radiotherapy. The histological diagnosis was metastasis of adenocarcinoma, and further clinical exams showed that the primary tumour was located in the breast.
Following treatment the patient's neurological signs improved, and ten years later the patient is still alive and autonomous (Table 1).

❒ Case 2

A previously asymptomatic 67-year-old man came to the hospital with severe paraparesis, which had developed over a period of two weeks. The spinal MRI showed a tumour in the conus medullaris at T12-L1 (Figure 1). The patient underwent surgery and the tumour was removed. The histological diagnosis was adenocarcinoma metastasis. Thoracic CT showed a small lung tumour, which was treated with chemotherapy and radiotherapy. Motor impairment significantly improved, leading to gait independence recovery, but the patient died 18 months later due to the progression of lung neoplasm (Table 1).

❒ Case 3

The final patient was a 72-year-old man who was admitted after one month of severe neck pain and progressive left-sided weakness. Neurological examination disclosed spastic tetraparesis with greater weakness in the left side, exaggerated deep tendon reflexes and bilateral Babinski's sign. In the upper limbs, tone was reduced and the reflexes were depressed. The cervical MRI showed a fusiform dilatation of the spinal cord from C4 to C6 with a syrinx below (Figure 1). Pre-operative x-ray revealed a pulmonary tumour. The metastasis was removed after C3-C6 laminectomy, and the histological diagnosis was adenocarcinoma. The patient recovered partial independence in daily living activity, which persisted for two years. He died twenty-eight months after surgery due to progression of the systemic disease (Table 1).

□ DISCUSSION AND CONCLUSION

Spinal cord syndrome occurring in a cancer patient is often ascribable to compression by an epidural metastasis[2,3]. In cases in which an intramedullary lesion is detected, differential diagnosis is between the collateral effects of cancer treatment (such as radiation myelopathy) or an ISCM.
Conversely, if the patient has an undiagnosed cancer and a solitary intramedullary lesion, the prime suspect is primary spinal cord tumour, such as astrocytoma or ependymoma[7,12,15]. In these cases, early symptoms are

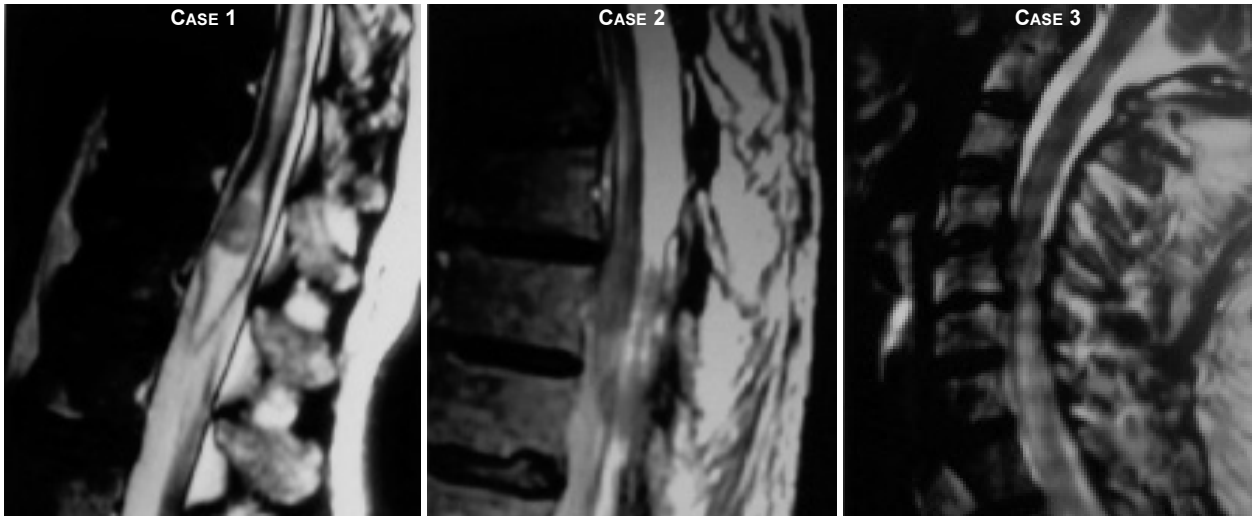

Figure 1. Preoperative sagittal T2-weighted MR images showing pre-operative lesions of the three cases.

Characteristics	Case 1	Case 2	Case 3
Age at surgery (years)/gender	45/female	67/male	72/male
Primitive tumour	Breast adenocarcinoma	Lung adenocarcinoma	Lung adenocarcinoma
ISCM location	L1	T12-L1	C4-C6
Clinic syndrome	Spastic paraparesis	Paraparesis	Tetraparesis
Pre-surgical motor assessment (Medical Research Council scale/Ashworth scale)	3/5 hip flexion/extension 2/5 knee and ankle flexion/extension with 1+ of spasticity at ankle level	2/5 hip, knee and ankle flexion/extension	2/5 left shoulder abduction elbow and wrist flexion-extension, hand grip 3/5 hip, knee and ankle flexion/extension
Pre-surgical sensory symptoms	Deep sensory deficit (tactile and proprioceptive) below lumbar region	Moderate reduction of proprioceptive and tactile aesthesia	Deep sensory deficit in upper and lower limbs
Pre-surgical modified Barthel index	44/105	39/105	10/105
Last post-surgical follow-up	10 years	18 months	2 years
Adjuvant therapy	Radiotherapy/hormone therapy	Radiotherapy/chemotherapy	Radiotherapy/chemotherapy
Post-treatment motor assessment (Medical Research Council scale)	4/5 hip flexion/extension 3/5 knee and ankle flexion/extension with 1 of spasticity at ankle level	4+/5 hip, knee and ankle flexion/extension	4/5 left shoulder abduction elbow and wrist flexion-extension, hand grip 4+/5 hip, knee and ankle flexion/extension
Post-treatment sensory symptoms	Mild tactile deficit	Moderate reduction of proprioceptive and tactile deficit	Mild tactile deficit of the upper arm
Post-treatment modified Barthel index	91/105	89/105	65/105
Final outcome	Alive 10 years after surgery	Death due to multiple brain metastases 36 months after surgery	Death 28 months after surgery

Table 1. Data of the three cases.

usually nonspecific, and their progression may be subtle and long lasting (symptoms are often present 3 to 4 years before diagnosis)[3,10]. Nevertheless, ISCM should not be ruled out, as highlighted by the cases reported here. In two of these patients, the diagnosis was made histologically, after surgical removal of the mass, whereas in the third case, the suspicion of a primary focus in the lung had already arisen during pre-operative examination.

In all cases the surgical treatment was intended to maximize resection because of the possible differential diagnosis with primary intramedullary tumours. Histology of the excised tumour tissue then enabled diagnosis and prompt treatment of the primary cancer. The duration of symptoms related to ISCM before neuroradiological diagnosis is generally shorter than that of other intramedullary tumours[16]. In about 75% of patients with ISCM, the time from onset to full neurological deficit is reported to be less than one month, and our findings confirmed this observation. When ISCM is the first sign of illness, the rapid development of neurological symptoms and neuroradiological findings atypical of astrocytoma or ependymoma may suggest the clinical diagnosis. MRI is also useful, and may show large high-signal-intensity areas on T2-weighted images and a strong ring of inhomogeneous enhancement on gadopentetate dimeglumine-enhanced T1-weighted images[14].

Our experience tells us that a solitary intramedullary metastasis, even in a patient with known systemic oncological illness, should be treated with surgery and conformational radiation therapy to relieve the neurological deficit produced by the mass, provided the patient is in good clinical condition with a life expectancy of over six months. This should reduce disability and improve functional status during this time. This conclusion is supported in literature by Kalayc et al. who compared the mean survival of patients treated either conservatively or surgically[9]. In the former group, the median survival was 5 months, whereas in the latter, it was increased to 9 months. The survival over one year increased by 11% in the conservatively treated group, as compared to 37% in those treated surgically.

Some Authors have recommended irradiation of the entire spinal cord of patients with unique ISCM, but, considering the potential bone marrow toxicity of this approach, we believe that conformational radiotherapy after surgical removal is more appropriate[3,11]. Although no well-designed study has compared this approach with the mainstay of solitary ISCM treatment, i.e., steroids, radiation and chemotherapy, in terms of long-term survival and functional results, recent reports have described excellent palliative results with local radiation and systemic chemotherapy following surgical excision[4].

To clarify this issue, and to remove the bias inherent in retrospective analysis and a limited number of patients treated at a single centre, a multicentric prospective randomized trial is necessary. However, on the basis of our, albeit limited, experience, surgical removal of ICSM followed by focused radiotherapy, associated with the treatment of systemic malignancies, improves survival and permits a good quality of life unhampered by the complications of immobility, adding to the increasing body of evidence on favourable long-term outcome in subjects where primitive systemic neoplasms have their clinical onset with ISCM and undergo surgical treatment[1,4,18].

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