

# Metastatic Spinal Cord Compression: an oncological emergency

## Introduction

---

This module aims to assist healthcare professionals identify and manage metastatic spinal cord compression (MSCC) in patients with whom they work. It will review the pathophysiology that leads to development of MSCC, and then help professionals develop the confidence and skills to identify possible cases, guide further investigation and implement appropriate management. There will also be the opportunity to explore and reflect on the impact of MSCC on patients, their carers and the healthcare system.

Readers will be directed to key literature to assist them in developing their understanding of the risk factors, nature and management of this significant problem. Throughout this module, readers will be encouraged to reflect upon their own practice, and to consider ways in which they can integrate awareness of MSCC into their own practice.

Undertaking this module should take approximately 7 hours, incorporating 5 hours of reading and activities and 2 hours of thinking and reflection.

## Learning Objectives

---

The activities and content of this module are built around the following learning objectives:

- understand the importance of early identification and definitive management of MSCC;
- understand the pathophysiological processes involved in risk and development of MSCC;
- be able to identify the signs and symptoms of early MSCC and decide on initial management;
- understand the importance and process of urgent confirmation of diagnosis of MSCC once clinical suspicion has been raised;
- understand the effects of a possible diagnosis of MSCC on patients and those caring for them and the importance of providing appropriate psychological support during all phases of diagnosis, treatment and rehabilitation;
- be aware of national and local guidelines for best practice in diagnosis and management of MSCC.

## Background

---

Progression of malignant disease to being metastatic is not uncommon and MSCC is a well recognised complication of such progression in patients. Spinal metastases occur in 3-5% of all patients with malignant disease (NICE, 2008). Development of spinal metastases may cause pain, collapse at single or multiple vertebral levels and development of MSCC, the risk increasing in part with disease duration, and with known widespread disease (NICE 2008). MSCC is most frequently seen (approximately 50% of all cases) in patients with lung, prostate and breast cancer although, in a significant proportion of cases (7%), no primary site of malignancy is identified (Levack et al, 2002; Levack et al, 2001). MSCC can be described as progressive paraplegia in cancer patients and is an oncological emergency.

MSCC is the result of compression of the spinal cord or cauda equina, the result of either direct tumour expansion or collapse of a vertebra. Left untreated, the consequence of MSCC is

irreversible neurological damage and paraplegia (Levack et al, 2002) and, therefore, early detection, diagnosis and treatment are vital where MSCC is suspected. Once paraplegia develops, improvement in function is not usually achievable. This has a significant impact on quality of life of both the patient and those close to them, major resource implications for health and social services, and can adversely affect the patient's survival.

Possible consequences in delaying treatment of MSCC include paraplegia (or quadriplegia in the case of cervical MSCC), loss of control of bladder and bowel function, loss of independence, marked reduction in quality of life and significantly reduced survival (Levack et al, 2001). For these reasons, instigation of appropriate treatment plans should be immediate and unacceptable delays should not be tolerated.

## **Pathophysiology**

---

The majority of cases of MSCC (85%) are the result of vertebral collapse leading to compression of the spinal cord or cauda equina. Such collapse is itself the result of haematological spread of malignant disease to the spine (Bucholtz, 1999; Levack et al, 2001). Compression can also occur due to direct tumour expansion (vertebral or soft tissue) or by means of direct cancer cell deposition within the spinal cord (Bucholtz, 1999).

MSCC most frequently occurs in the thoracic spine, with a significant minority (4-7%) in the cervical spine (Cook et al, 1998; Levack et al, 2002; Loblaw et al, 2003), with obvious more serious implications for both function and survival. Levack et al, (2002) found that 17% of patients had two or more levels of MSCC.

The results of compression are similar to those seen in other tissues – oedema and venous congestion – but the resulting cell damage is characterised by neural demyelination and, with prolonged, untreated compression, infarction of the spinal cord results. There is little chance of significant functional improvement after this occurs (Patchell et al, 2005). Sudden onset MSCC has a worse functional prognosis than gradual, slow onset MSCC, as there is less time for tissues to adapt.

## **Signs and symptoms**

---

Awareness of the potential meaning of symptoms described by patients that may indicate possible MSCC is of greater importance than ability to recite such signs and symptoms as a list. Back pain is a frequent early symptom of MSCC described by the vast majority of patients, but is experienced by a great many patients without MSCC, and therefore its importance may be overlooked. Pain may precede other clinical signs of MSCC (Byrne, 1992; Portenoy, 1997; Levack et al, 2001).

Back pain frequently precedes any onset of neurological symptoms or signs, and sudden onset or increase in severity of back pain should be investigated promptly. A common misconception is that MSCC is not present unless limb weakness, bladder and / or bowel dysfunction and altered sensation are present. Levack et al, (2001) found that 85% of patients with MSCC experienced limb weakness. However, such weakness can go unrecognised and be difficult to detect accurately. Sensory deficits do occur, and can relate to the level of spinal involvement (Held & Peahota, 1993) but aren't necessarily indicative of degree of spinal damage due to compression (Levack et al, 2001). Bladder and bowel dysfunction, signs of significant autonomic nerve disturbance, occur late in development of MSCC.

## Investigation

---

Magnetic Resonance Imaging (MRI) of the whole spine is the investigation of choice in investigating suspected cases of MSCC. It should be requested urgently and performed within 24 hours of clinical suspicion. In some cases (e.g. pacemaker, metal implants, severe claustrophobia), MRI is not possible and Computerised Tomography (CT) may have to be performed instead. Clinicians should liaise with local Radiology specialists to discuss appropriate investigation of suspected cases of MSCC.

### Thinking Point:

Given that many patients you encounter have both bone metastases and back pain, how do you distinguish between patients at risk of MSCC and those who you feel do not need further examination or investigation?

- Are you aware of any local guidelines regarding the diagnosis and management of MSCC? If not, consider investigating this further.
- Will your practice change (and how?) in light of your new understanding of the mechanisms and presentation of MSCC?

## Activity 1 (allow 180 minutes)

---

**Task 1:** Review the anatomy of the spinal column and cord, and patterns of innervation (motor and sensory) at various levels of the cord / cauda equina. Revise and practice neurological examination techniques and become confident in eliciting normal findings in order to be able to recognise abnormalities.

**Allow 60 minutes for reading and 60 minutes for practical review**

**Task 2:** Take time to consider the patients you have encountered over the past two weeks. How many have had spinal metastases? How many have had symptoms that match those of a patient with MSCC? Have any been diagnosed with MSCC? How easy (or difficult) was the process of clinical diagnosis, arranging investigations and, where necessary, obtaining appropriate further management? If there were any delays or difficulties, how could the process be made easier in the future?

**Allow 60 minutes for reflection**

### Resources required to complete this activity

#### Useful websites

Cancerbackup – for an overview of MSCC and insight into the information available to your patients.

<http://www.cancerbackup.org.uk/Resourcessupport/Symptomssideeffects/Othersymptomssideeffects/Malignantspinalcordcompression>

Cancer Research UK – for an overview of MSCC and insight into the information available to your patients.

<http://www.cancerhelp.org.uk/help/default.asp?page=48386>

National Institute for Health and Clinical Excellence – guidance issued November 2008

<http://guidance.nice.org.uk/CG75>

Primal Pictures – 3D models of the human anatomy

<http://www.anatomy.tv/tour.aspx> (requires a subscription or Athens password)

Medical-Look.com is a website about drugs and diseases.

[http://www.medical-look.com/human\\_anatomy/](http://www.medical-look.com/human_anatomy/)

## **Background reading**

Anatomy textbook of your choice

Clinical examination textbook outlining neurological examination techniques

Bucholtz JD (1999). Metastatic epidural spinal cord compression. *Seminars in Oncology Nursing* 15(3): 150-9.

Byrne TN (1992). Spinal cord compression from epidural metastases. *New England Journal of Medicine* 327: 614-9.

Cook AM, Lau TN, Tomlinson MJ (1998). Magnetic Resonance Imaging of the whole spine in suspected spinal cord compression: Impact on management. *Clinical Oncology* 10: 39-43.

Held JL & Peahota A (1993). Nursing care of the patient with spinal cord compression. *Oncology Nursing Forum* 20(10): 1507-16.

Levack P, Graham J, Collie D (2001). A prospective audit of the diagnosis, management and outcome of malignant spinal cord compression. *NICE Clinical Audit & Resource Group Levack et al.* 2001 97/08.

<http://www.crag.scot.nhs.uk/committees/CEPS/reports/F%20Report%20copy%206-2-02.PDF>

Levack P, Graham J, Collie D (2002). Don't wait for a sensory level – Listen to the symptoms: a Prospective audit of the delays in diagnosis of malignant cord compression. *Clinical Oncology* 14: 472-80.

Loblaw DA, Laperriere NJ, Mackillop WJ (2003). A population-based study of malignant spinal cord compression in Ontario. *Clinical Oncology* 15(4): 211-7.

[http://qcri.queensu.ca/CCE\\_Pub\\_No\\_126\\_Loblaw\\_2003\\_15\\_pp\\_211-217.pdf](http://qcri.queensu.ca/CCE_Pub_No_126_Loblaw_2003_15_pp_211-217.pdf)

National Institute for Clinical Excellence (2004). Improving supportive and palliative care for adults with cancer. NICE, London. <http://www.nice.org.uk/nicemedia/pdf/csgspmanual.pdf>

Patchell RA, Tibbs PA, Regine WF (2005). Direct decompressive surgical resection in the treatment of spinal cord compression caused by metastatic cancer: a randomised trial. *Lancet* 266: 643-8.

Portenoy RK (1997). Chronic nociceptive pain syndromes: Cancer pain. In: North RB, Levy RM (eds): *Neurosurgical Management of Pain*. Springer-Verlag, New York. pp62-74.

## Management

---

All patients with confirmed MSCC should be discussed with the on-call Clinical Oncology or Neurosurgery specialist (Consultant or Specialist Registrar) or the relevant MSCC contact according to local guidelines / protocols.

### **Steroid treatment**

If there is a high index of clinical suspicion of MSCC, high dose steroids should be commenced without delay (dexamethasone 16mg orally or intravenously as an immediate dose, then 16mg once daily) (NICE, 2008; Christie, 2009). Patients should also receive gastroprotection (e.g. lansoprazole 30mg once daily). High dose steroid treatment should be continued for five days from the start of radiotherapy (if it is given) to reduce radiation-induced inflammation and peritumour swelling. Steroid treatment should then be reduced gradually, rather than being stopped abruptly (e.g. reducing by 2mg every three days providing pain or neurological deficit do not increase) (NICE, 2008). Patients should be monitored for steroid-related side effects, including candidiasis and raised blood sugars.

If investigation by imaging (MRI or CT scan) confirms the diagnosis of MSCC, a senior clinician (Consultant or Specialist Registrar) must refer the patient to specialist colleagues in Clinical Oncology or Neurosurgery for consideration of further, urgent specialist treatment. Ideally, this should be within 24 hours of onset of neurological symptoms and certainly within 24 hours of radiological diagnosis by imaging.

### **Surgery**

Some cases of MSCC are amenable to surgery and referral should be made to local neurosurgery or spinal orthopaedic services, with imaging available, as a matter of urgency. Surgery may be considered where:

- there are limited levels of cord compression on imaging;
- there is minor neurological impairment;
- previous radiotherapy has already been given at the level of MSCC;
- where spinal instability is present;
- general anaesthesia and surgery are not contra-indicated for other reasons;
- prognosis is estimated to be six months or longer.

Early surgery, before the patient has developed severe neurological deficits, produces the best outcome and is best undertaken prior to radiotherapy, as there is less risk of wound complications. Surgery for metastatic spinal disease is undertaken for neurological deficits, pain and deformity. However, some patients who fulfil the above criteria may not be suitable candidates for surgical intervention following neurosurgical consideration due to comorbidity, poor functional status prior to development of MSCC or short prognosis, among others.

### **Radiotherapy**

The aims of radiotherapy are to reduce pressure on the spinal cord through tumour shrinkage and to achieve local tumour control at this site, but may also be given as a palliative measure to provide control of pain. Radiotherapy may be appropriate where there is an established diagnosis of metastatic cancer and:

- the patient is not fit to undergo surgery;
- there is extensive vertebral involvement;
- there is disease and MSCC at multiple vertebral levels;
- the patient has not previously received radiotherapy to the area;

- especially if the tumour type is sensitive to radiotherapy (e.g. small cell lung cancer, myeloma).

Radiotherapy may still be of benefit, even in the case of a patient with major neurological deficit, as it may help prevent loss of remaining sphincter control and help reduce pain. Results of radiotherapy are closely linked to neurological status at the time of treatment – advanced loss of neurological function is unlikely to be improved by treatment (NICE 2008).

In patients with advanced metastatic disease and confirmed MSCC, most would receive radiotherapy either as a single treatment or as a course of fractionated treatment. This would depend on their clinical condition at the time. In certain cases, patients previously treated with radiotherapy may be considered for re-treatment, depending on multiple factors including time since initial treatment, previous dose, likely prognosis and area of treatment overlap.

## Rehabilitation

---

The focus of care for patients with life-limiting disease should always be on the promotion of independence and quality of life. Supportive care and rehabilitation are key to achieving these goals and are integral to the approach to and management of MSCC. NICE guidance on supportive and palliative care specifically promotes a patient-centred approach to care (NICE, 2004).

Components of rehabilitation include considerations of thromboprophylaxis, management of pressure ulcers, bladder and bowel management and maintaining circulation and respiratory function, as well as physiotherapy, occupational therapy, psychological support and nursing and social care.

## Prognosis

---

Patient survival following diagnosis of MSCC has been linked to the patient's ability to walk at the time of diagnosis (Levack et al, 2001). However, median survival of patients who receive no treatment for MSCC is approximately one month (Loblaw et al, 2003). In all patients, median survival is approximately 2-3 months (Levack et al, 2001; Loblaw et al, 2003). MSCC can thus be regarded as a life-limiting consequence of metastatic malignant disease.

Longest survival has been reported in patients with haematological malignancies and prostate cancer (Loblaw et al 2003), with shortest survival in patients with lung cancer, although this data may be influenced by the underlying disease processes as well as MSCC.

Patients who receive surgery as the primary management of MSCC appear to have a significantly improved rate of survival (Levack et al, 2001). This is likely to be linked to patients' appropriateness for surgical intervention rather than a direct result of surgery itself.

## Activity 2 (allow 90 minutes)

---

**Task 1:** Review guidance produced by the National Institute for Health and Clinical Excellence (2008) outlining the evidence available regarding the identification, diagnosis, management and impact of MSCC.

**Allow 60 minutes for reading**

**Task 2:** What other guidelines relating to MSCC, produced by a professional body or produced locally, influence your practice?

**Allow 30 minutes for reading**

### Resources required to complete this activity

#### Useful websites

National Institute for Health and Clinical Excellence – guidance issued November 2008

<http://guidance.nice.org.uk/CG75>

#### Background reading

Levack P, Graham J, Collie D (2001). A prospective audit of the diagnosis, management and outcome of malignant spinal cord compression. NICE Clinical Audit & Resource Group. Levack et al. 2001 97/08.

<http://www.crag.scot.nhs.uk/committees/CEPS/reports/F%20Report%20copy%206-2-02.PDF>

Loblaw DA, Laperriere NJ, Mackillop WJ (2003). A population-based study of malignant spinal cord compression in Ontario. *Clinical Oncology* 15(4): 211-7.

[http://qcri.queensu.ca/CCE\\_Pub\\_No\\_126\\_Loblaw\\_2003\\_15\\_pp\\_211-217.pdf](http://qcri.queensu.ca/CCE_Pub_No_126_Loblaw_2003_15_pp_211-217.pdf)

### Impact of MSCC

---

MSCC has been identified as an oncological emergency and, as such, approach and care could very easily become focused on the medical aspects of diagnosis and management of the condition. However, it should be remembered that signs, symptoms, resulting disability and the 'healthcare-centred' processes of diagnosis and management all have a significant impact on the patient, their family and / or carers and those healthcare professionals involved in their care. Diagnosis of MSCC can cause significant psychological distress in patients with cancer and those close to them (NICE, 2008) and it is therefore important that all those involved in a patient's care be mindful of the potential support that may be needed.

Research into patient experience of MSCC and detailed exploration of patient narratives have revealed several recurring themes in the experience of MSCC from professionals, patients and those caring for them (NICE 2008). Often, patients are not aware of the early 'warning' signs of MSCC. There may also be a lack of awareness among some professionals of early symptoms and signs of MSCC. In addition, there can be delays in diagnosis of MSCC once an 'at risk' patient is referred to secondary care, reduction in options for management of MSCC due to delays in the diagnostic / management process and variable provision in options and availability of supportive care and rehabilitation post diagnosis / initial treatment. Communication during the patient journey through presentation, diagnosis, initial treatment and ongoing management phases has also been highlighted as an area requiring attention, with most patients in one study being dissatisfied with communication throughout their care (NICE, 2008).

Such findings highlight the need for effective, clear and consistent communication with patients and those caring for them from the first recognition of the possibility of diagnosis of MSCC. Patients should, wherever possible, be fully informed about their condition and options for management, as well as being involved in decisions regarding both initial and ongoing treatment.

Patients with MSCC and their families should be offered emotional and psychological support appropriate to their needs and should be provided with information at all stages of the diagnostic / treatment processes.

### **Activity 3 (allow 60 minutes)**

---

**Task 1:** Reflect on the anatomical, physiological and functional effects of MSCC on patients. Consider the implications for the patient, their family and those caring for them, and the possible implications to local healthcare providers in terms of resources required from primary and secondary care.

- How would such a patient be cared for and supported in your area?
- Who would need to be involved?
- What (if any) difficulties might arise?

Reflect on your role in this process.

**Allow 60 minutes for reflection**

#### Resources required to complete this activity

##### **Useful websites**

National Institute for Health and Clinical Excellence – guidance issued November 2008  
<http://guidance.nice.org.uk/CG75>

### **Discussion Board**

The discussion board is a forum in which you can exchange ideas with other participants. This activity relates to the work you will have completed in earlier tasks and provides an opportunity for you to explore the difference in perspectives between the participants.

#### Discussion Board

##### **When will it take place**

For a 3 month period from date of publication of this article.

##### **Which discussion thread**

Metastatic Spinal Cord Compression: an oncological emergency

##### **What is expected of you as a participant**

In particular consider the following:

- what are the barriers to recognising patients with possible cases of MSCC?
- what are the issues that should be considered when developing services to diagnose and manage MSCC?
- what are the needs experienced by patients with MSCC, their families and carers?

## Summary of this module

---

MSCC is an oncological emergency. The detection and diagnosis of MSCC relies almost entirely on obtaining a thorough and accurate history and the diagnostic clinical skills of the health professional assessing the patient.

- be alert to possible spinal cord compression in patients who are at risk and who present with warning signs and symptoms
- maintain a low threshold for further investigation of such patients and for discussing them with specialist colleagues
- if MSCC is suspected, commence high dose steroids (16mg dexamethasone orally in the morning) immediately
- ensure imaging to confirm diagnosis of MSCC is carried out within 24 hours of clinical suspicion
- ensure prompt treatment within 24 hours of diagnosis.

### On completion of this module you will have had the opportunity to:

- be confident in recognising patients with possible cases of MSCC;
- understand the processes involved in confirming diagnosis of MSCC;
- be aware of the options for, and mechanisms of obtaining, initial treatment of MSCC and further rehabilitation;
- have an awareness of the impact that MSCC can have on patients, their families and carers, and local healthcare organisations / providers.

#### **Dr Iain Lawrie**

Consultant in Palliative Medicine  
North Manchester General Hospital & St Ann's Hospice  
Little Hulton, UK.

#### **Dr Richard Berman**

Consultant in Palliative Medicine  
North Manchester General Hospital & The Christie  
Manchester, UK.

Contact address: North Manchester General Hospital,  
Delaunays Road, Crumpsall, Manchester M8 5RB  
email: [iain.lawrie@pat.nhs.uk](mailto:iain.lawrie@pat.nhs.uk)