SPINAL CORD COMPRESSION

What is malignant spinal cord compression (MSCC) exactly? What does it mean for the patient? How do we detect it? MSCC is an oncological emergency. The only way to prevent damage and functional loss from MSCC is to identify it and treat before it fully evolves. Importantly, treatment almost always also provides improved symptom control (Loblaw, Perry, Chambers, Laperriere, 2005).

Prostate, breast and lung cancers each cause about 20% of MSCC episodes, with myeloma, non-Hodgkin's lymphoma and renal cell carcinomas each accounting for about 10% but any patient with cancer is at risk (Avery & Avery, 2008; McCormick, & Rowland, 2010). Between 2% - 5% of cancer patients can expect an episode of MSCC in the last two years of life and about 15% will have more than one episode during their illness. There are also several non-malignant causes of cord compression such as abscess, trauma to vertebrae or ischaemia of the cord from oedema or haemorrhage (Hauser, & Ropper, 2010).

The spinal cord carries sensory inputs and coordinates motor output, so any damage to it will be reflected in sensory and motor changes. Because it is structurally divided into distinct columns and tracts, each with specific functions (Hauser, & Ropper, 2010), any damage will present in a pattern of motor dysfunction and sensory loss below the level of injury. These patterns can evolve over weeks or months with only subtle signs and symptoms at first. Neurological signs can be further divided between Upper and Lower Motor Neurone (UMN & LMN) origins (See Table 1). The UMN and LMN junction is at the spinal nerve root. In practical terms it is the UMN signs that are important for MSCC.

Table 1

Signs of Upper Motor Neuron (UMN) & Lower Motor Neuron (LMN) Lesions		
Sign	**UMN Lesions**	**LMN Lesions**
Weakness	Yes	Yes
Atrophy	No	Yes
Fasciculations	No	Yes
Reflexes	Increased	Decreased
Tone	Increased	Decreased
Babinski sign	Yes	No

An established malignancy is the main predictor of MSCC, but it is the presenting complaint in about 20% of all MSCC cases (Loblaw, Perry, Chambers, Laperriere, 2005), so we should have a low threshold for considering neurological examination.

MSCC Signs & Symptoms or 'Red Flags'

Pain: New or worsening back pain, often with tenderness over the vertebrae that is worse on movement. In up to 95% of cases of MSCC back pain is the primary symptom. The site of pain is often 2-3 vertebral levels above the compression and often described as a 'banding' sensation around the body. Usually worse on straining and radiates: lumbar region, buttocks or down the legs.

Motor Signs: Reduced strength (fingers, hands, feet or legs) or feeling unsteady when walking or loss of coordination.

Sensory Signs: Pins and needles, tingling, numbness or loss of sensation in an area and any reports of changes in spatial awareness (proprioception).

Autonomic Signs: Urinary hesitancy, retention, erectile dysfunction, constipation or incontinence of urine or faeces.

Patients with any of these Red Flags should be screened for MSCC. It's likely that altered motor and reflex responses will be the first observed signs rather than sensory changes which are difficult to discern and usually present later (Lowenstein, Martin, & Hauser, 2010). Because about 60% of MSCC occur at the thoracic level and 30% in the lumbosacral region most signs and symptoms will be evident in the lower limbs.

What can we do?: Do a screening neuro exam for MSCC!
See the YouTube links below for easy to understand neuro examination examples.

Upper limb: Geeky Medics
https://www.youtube.com/watch?v=0hhcxaeOCYs&list=PLwYICl63HBzkXbEb6dDJBb0mP8o--91ox&index=2&t=0s

Lower limb: Geeky Medics
https://www.youtube.com/watch?v=-7ERNH_o5Ss&list=PLwYICl63HBzkXbEb6dDJBb0mP8o--91ox&index

General inspection and history: Inspection of posture, gait, with pain history and vertebral palpation and gentle percussion. Motor or sensory changes, bladder/ bowel changes should be noted as should muscle wasting or difficulty moving (Cox, 2004; Schwartzman, 2006).

Tone: Tone is the resting level of tension or rigidity in the body. It can be increased (hypertonic) or diminished (flaccid or hypotonic). Assessing should include the all limbs: shoulder, elbow, wrist, thigh, knee and ankle including the Babinski response (Schwartzman, 2006) (see above YouTube links). Increased tone is significant for MSCC.

Power: Assessing motor function should focus on all limb movement and power but is affected by muscle strength, patient effort and cooperation. Muscle power testing involves rating the patient contracting a muscle group against resistance (see Table 2) (Cox, 2004; Schwartzman, 2006). Reduced power is significant for MSCC.

Table 2

	Motor (power) Scoring Scale
0	No muscle contraction, complete paralysis
1	Muscle contraction visible, but no joint movement noted
2	Joint movement when gravity is eliminated
3	Movement against gravity only but not against resistance
4	Muscle movement against gravity and a moderate amount of resistance
5	Full power against gravity; normal muscle strength

Reflexes: The deep tendon or muscle stretch reflexes include biceps, triceps, and supinator (also called the brachiocephalic or brachioradialis), and plantar (Babinski) reflex. Increased reflexes are significant for MSCC (see Table 3). This includes clonus which is the rhythmic contractions/spasms, sometimes called 'beats' seen when testing the ankle for tone or reflexes.

Table 3

Reflex Responses	
0	Absent
1+	Diminished
2+	Normal
3+	Brisk or Hyperactive- no Clonus
4+	Brisk or Hyperactive- with Clonus

Sensation: Assessment should include light touch and pain (also known as sharp touch) comparing left and right sides. For sharp touch, a neurotip or other pointed implement should be used at each dermatome from distal to proximal. Repeat the process with cotton wool or tissue instead of neurotip for light touch (Cox, 2004; Schwartzman, 2006). The patient should be able to recognise sharp vs light sensations. Proprioception and vibration are deep sensations but not usually important for MSCC screening.

MSCC Outcomes: Age, tumour type, distribution and comorbidities all affect outcomes but the higher the vertebral level affected the poorer the prognosis overall (Abrahm, 2004). Pre-treatment function is also a strong predictor of both post treatment function and prognosis. For walking patients presenting with MSCC, about 70% will be able to walk after treatment. If partially paralysed at presentation, only 35% will be able to walk after treatment and if already paraplegic at presentation, only 5% will ever walk again. Survival data is also grim, with patients who can walk after treatment having a median survival of eight months, but if paraplegic after treatment, the median survival drops to one or two months (Avery & Avery, 2008). In many cases the lower limb examination will be more definitive, particularly in relation to altered power and reflexes. This may be sufficient for a high suspicion of MSCC and prompt imaging.

Imaging: MRI of the whole spine is the gold standard imaging tool with very high specificity and sensitivity (Abrahm, 2004).

Management options: Radiotherapy, chemotherapy and surgical options should be explored but will be specific to each patient's situation.

Medication options: Steroids will be important for reducing swelling and therefore damage control and analgesia will be required for pain management.

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