**Presentation of metastatic spinal cord compression (MSCC) & cauda equina syndrome**

### Definition of metastatic spinal cord compression (MSCC)
- MSCC (metastatic or malignant spinal cord compression) is where a cancer or metastasis presses on and subsequently compresses the spinal cord.
  - Compression can also occur due to compromise of spinal stability due to vertebral metastases and compression from associated fractures.
- Cauda equina syndrome is the same process but occurring at or below the level of the cauda equina (typically at the level of L1)
  - Both usually presents with pain and weakness and should be treated the same way
  - Cord compression leads to upper motor neuron (UMN) pattern of weakness, cauda equina presents with lower motor neuron (LMN) pattern
- Incipient or impending cord compression (where the cord is threatened but not yet compressed) should initially be managed the same way as established cord compression.
- Note 1: vertebral metastases are found in 30-90% of patients dying with cancer and often do not cause cord compression
- Note 2: There are also non-malignant causes of cord compression, whose management is not addressed here

### Causes of metastatic spinal cord compression (MSCC) / cauda equina syndrome
- Malignancy
  - Vertebral metastases or primary (e.g. myeloma)
  - Subdural or epidural tumour
  - Intraspinal metastases or primary (may cause isolated Brown-Séquard syndrome)
- Epidural Haematoma
- Epidural abscess
- Intervertebral disc herniation
- Vertebral fracture or subluxation

### Causes of symptoms mimicking MSCC and cauda equina syndrome
- Musculoskeletal back pain
- Muscle spasm / sprain
- Acute spinal radiculopathy due to intervertebral disc herniation
- Rheumatological disease
  - Spinal osteoarthritis
  - Osteoporotic vertebral fracture
  - Ankylosing spondilitis
- Discitis
- Malignant vertebral disease / fracture
- Diffuse leptomeningeal metastatic disease

### History in spinal cord compression / cauda equina syndrome
- Presenting complaint
  - New back pain (present in >90%), usually precedes neurology by several weeks, often worse lying down. May be radicular in character (shooting pain in a nerve root distribution).
    - Pain on movement suggests spinal instability
    - Abrupt worsening suggests pathological fracture
  - Focal leg weakness
• Difficulty walking (in >50%)
  • Sphincter dysfunction (urinary retention or incontinence; faecal incontinence)

• History of presenting complaint
  •Timing of onset
  •History of malignancy (but 20% are new presentations of malignancy)
    ▪ Primary site
    ▪ Tumour grade
    ▪ Staging
    ▪ Treatment to date

• Known spinal disease
  •Features suggesting specific cause or alternative diagnosis
    ▪ Fevers (?abscess); coagulopathy (?haematoma); history of severe arthritis or morning stiffness (?rheumatological)
  •There is often a history of trauma; this does not rule out malignant disease and these patients should still be investigated.

• Past medical history
  •History of intravenous drug use (increases risk of epidural abscess)
  •Previous spinal surgery or arthritis
  •Metabolic bone disease impacts treatment options
    ▪ Osteoporosis; Vit D deficiency; hyperparathyroidism

• Medications & allergies
  •Previous treatment with or reactions to
    ▪ Bisphosphonates
    ▪ Steroids

• Social history
  •Baseline mobility
  •Functional status (and therefore performance status)
  •Perceived diagnosis and prognosis

Examination of metastatic spinal cord compression (MSCC) and cauda equina syndrome

• Spinal examination
  •Focal spinal tenderness may be present

• Neurological examination
  •Cord compression classically causes a pyramidal pattern of weakness [increased tone in both legs, bilateral weakness in flexors, brisk reflexes and upgoing plantars]
  •Cauda equina will typically cause lower motor neurone weakness [flaccid tone in both legs, bilateral weakness, reduces or absent reflexes and absent plantars]
  •Sensory level (may be absent, typically 1-5 levels below actual level; sacral sensation is lost in cauda equina syndrome, but may be preserved in cord compression)
  •Loss of anal sphincter tone is a late sign, and should be tested by digital rectal exam
  •HOWEVER the pattern of neurological signs may be irregular, and is poor at localising the lesion
  •Note the above make up the ASIA score

• There may be isolated radiculopathy with weakness in a single nerve root distribution

Scoring systems in MSCC / cauda equina

• There are many important systems that can be used. The most important are ASIA and SINS.
  •ASIA (American Spinal Injury Association)
    ▪ Clinically assesses neurological deficit in spinal cord injury
    ▪ Click here for ASIA scoring and background
  •SINS (Spine Instability Neoplastic Score)
Assesses spinal stability based on various categories
Click here for SINS scoring and background

Initial management of metastatic spinal cord compression (MSCC) / cauda equina syndrome
- If suspected, dexamethasone 16mg PO/IV stat, followed by 8mg PO/IV twice daily (8am and 2pm)
  - Always give with a proton-pump inhibitor (e.g. omeprazole 20mg PO once a day)
- Analgesia
  - Paracetamol
  - Ibuprofen (if renal function reasonable, no GI issues and not bleeding)
  - Opiates if needed (with antiemetic and laxative)
- Bloods
  - FBC, U&E, LFT
  - Calcium and phosphate
  - Coagulation, group and save
- MRI of whole spine
  - Clinical signs are poorly localising; 33% of affected patients have coincident metastases elsewhere in the spine so it is vital to scan the whole spine prior to any intervention
  - Note that if MSCC is diagnosed and the patient is appropriate for surgery a CT will likely also be needed to assess bony stability

Further management of spinal cord compression / cauda equina syndrome
- If MRI is contraindicated [e.g. by pacemaker], CT myelography can be performed
  - This requires intrathecal administration of contrast, so there must be no contraindications to lumbar puncture
- Definitive management is usually either radiotherapy or surgery
  - Very chemo-sensitive diseases (e.g. Hodgkin’s disease, neuroblastoma, germ cell cancers) may be treated with chemotherapy alone
  - Circumferential surgical decompression plus radiotherapy is superior to radiotherapy alone (ambulatory rate increases from 57% to 84%)
  - Few units have the resources to offer all patients decompressive surgery, so for most patients external beam radiotherapy is the definitive treatment, improving pain and neurology.
    - Doses and schedules vary; a single fraction of 8Gy may suffice if life expectancy is short
  - Surgery is mandatory if the spine is unstable (a score over 6 on the Spine Instability Neoplastic Score), and a bone biopsy is required if it is a new presentation without accessible disease elsewhere.
  - Otherwise decisions on surgery are taken by the spinal surgery team; patients under 65 derive more benefit from surgery than those over 65.
- Stereotactic body radiotherapy can minimise irradiation of normal tissue. It may be useful in patients without high-grade cord compression.
- Bone protection
  - A bisphosphonate (e.g. alendronate 70mg once daily PO, or zoledronate 4mg IV once a month) should be given for bone metastases as secondary prevention of fractures, provided there are no contraindications.
    - Also give calcium and vitamin D supplementation
  - Denosumab, a monoclonal antibody against RANK ligand, is an alternative which is at least as effective, but is more expensive.
- Bed rest
  - If the spine is unstable (see SINS score) bed rest and/or bracing may be indicated – discuss with neurosurgeons
If the spine is stable there is no need for bed rest; patients will avoid manoeuvres that trigger their pain.

- Prophylactic low molecular weight heparin should be given for DVT prophylaxis, unless contraindicated.
- Laxatives should be available (immobility, pain and opiates all contribute to constipation).

**References**