Spinal Cord Compression

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Intended Audience

This document contains information and clinical guidelines for management of children under the care of, or being referred to the Oncology and Haematology department at Sheffield Children's NHS Foundation Trust (SCFT). It is to be used by staff within the Trust whenever they are caring for these children either in hospital or at home. It may also be used by staff caring for children in shared care centres.

Purpose
This document is intended to guide the identification, investigation and initial management of suspected spinal cord compression in haematology and oncology patients.

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1. Introduction

Acute compression of the spinal cord and/or cauda equina can occur in children with cancer. Immediate recognition and treatment are essential for optimal outcome.

Cord compression develops in around 4% of children with cancer. This is usually as a result of one or more of the following mechanisms:

- Direct spread of tumour.
- Metastatic vertebral bone disease with secondary cord compression.
- Spread to the epidural space by infiltration of the vertebral foramina.
- Occasionally secondary to haemorrhage (may also occur in non-malignant haematological conditions e.g. haemophilia).

Sarcomas (such as rhabdomyosarcoma or Ewings) and neuroblastoma account for up to 65% of cases. Lymphoma and leukaemia account for most of the rest. Leptomeningeal metastases from medulloblastoma can also compress the cord, often causing more diffuse symptoms.

Although more likely to occur in the terminal phases of widely metastatic malignancy, spinal cord compression may be the presenting sign of cancers such as neuroblastoma, lymphoma or rarely sarcoma. Intramedullary tumours (within the cord itself) are less common, and may result in unilateral signs. Treatment related myelitis may also cause neurological complications, and cannot readily be distinguished from cord compression on clinical grounds alone.

Most children with cord compression will have a motor deficit, although this may be subtle. 60- 80% of children will have back pain. This may be either local or radicular. Incontinence or other abnormalities of bowel and bladder function are common (up to 40%). Sensory abnormalities are less frequent.

2. Examination

Detailed neurologic examination with attention to extremity strength, reflexes and tone and determination of a sensory level is mandatory. Localised tenderness to percussion is found in around 80-90% of patients and the level of maximal spinal tenderness is a reliable localising sign. Most patients with spinal cord compression have significant objective loss of motor strength in the extremities. Sensory loss or a sensory level may be difficult to document accurately. The level of cord involvement can usually be determined on clinical findings (see Table overleaf).

A child with cancer who develops localised or radicular back pain should be considered to have spinal cord compression until proved otherwise. The absence of weakness or sensory abnormalities does not reliably exclude the diagnosis.

Clinical Localisation of Epidural Cord Compression

Sign	Spinal Cord	Conus	Cauda Equina
Weakness	Symmetric, profound	Symmetric, variable	Asymmetric May be mild
Tendon Reflexes	Increased or absent	Increased knee, decreased ankle	Decreased, asymmetric
Babinski	Extensor	Extensor	Plantar
Sensory	Symmetrical Sensory level	Symmetrical Saddle anaesthesia	Asymmetric Radicular
Sphincter Abnormality	Spared until late	Early involvement	May be spared
Progression	Rapid	Variable, may be rapid	Variable, may be rapid

3. Investigation

Spine radiographs are not always helpful as 50% of children will have normal x-rays

MRI scan with and without gadolinium enhancement is essential if cord compression is suspected.

The whole spine should be imaged if there is doubt about the level or possibility of more than one lesion (e.g. medulloblastoma).

The conus may be difficult to image fully with MRI.

4. Management

All patients must be discussed with on call Oncology Consultant and Neurosurgical team as soon as cord compression is suspected

If history and examination suggests severe or progressive spinal cord compression give dexamethasone by slow intravenous injection as per BNFc recommendations for life threatening cerebral oedema prior to **emergency** MRI scan. Transfer to SCH for scan may be the best option. Scan under GA may be necessary to obtain optimal images. Subsequent treatment should be with Dexamethsone as per the APPM Master Formulary, unless higher doses are felt to be required clinically. Prescribe lansoprazole to reduce gastrointestinal toxicity Monitor blood pressure and check blood glucose during treatment with high dose steroids.

If signs are equivocal or there is no evidence of progressive of neurological dysfunction, prescribe Dexamethasone in line with the APPM Master Formulary, unless a higher dose is felt to be required clinically. MRI should be carried out within the next 24 hours.

APPM Master Formulary Dosing for spinal cord compression (6th Edition, 2024)

By mouth or short intravenous infusion over 15-20 minutes:

- Child 1 month- 11 years: 250micrograms/kg twice daily for 5 days; then stop
- 12 years and over: 8mg twice daily (or 16mg once daily) for 5 days, then stop

If an epidural mass is demonstrated the spinal cord should be immediately decompressed. Although corticosteroids reduce oedema rapidly and result in neurological improvement they are not an alternative to cord decompression.

Focal radiotherapy, surgical decompression or chemotherapy may be used (depending on the underlying condition). There is little evidence to recommend one over the other apart from in the child with an unknown primary, when surgery provides an opportunity to biopsy the lesion.

In children with a known diagnosis radiotherapy is often preferable, particularly where the tumour is known to be radiosensitive. Dexamethasone is continued during radiotherapy.

In some children e.g. infants with neuroblastoma, chemotherapy is preferable to surgery and radiotherapy and can be rapidly effective.

5. Supportive Care

Patients with spinal cord injury may have a range of medical complications, and therefore require multidisciplinary management: : See SCFT Clinical Guideline Paediatric Spinal Cord Injury Pathway - CG1806 for further information.

The following issues may need consideration:

Spinal stability	Lesions infiltrating bone may significantly weaken the spine and until proven otherwise the child should be nursed flat with a neutral spine. Care of pressure areas is important
Pain	Significant pain may require opiates or analgesia for neuropathic pain See SCFT Clinical Guideline: Analgesia in Malignant Disease (patients not receiving palliative care) - CG1463
Constipation	Efforts should be made to maintain soft and regular bowel motions. See SCFT Clinical Guideline: Constipation Prophylaxis and Management - CG903
Urinary retention	Catheterisation may be required
Dexamethasone side effects	Hyperglycaemia, hypertension and gastric erosion may occur
Biochemical derangement	Although uncommon, children and young people may suffer hypercalcaemia as part of an infiltrative process. They may also undergo tumour lysis and renal dysfunction secondary to dexamethasone therapy (particularly in leukaemia/lymphoma). See SCFT Clinical Guideline Tumour Lysis Syndrome - Prevention and Management – CG899
Thromboprophylaxis	Consideration should be given to use of stockings +/- LMWH in those at very high risk of thrombosis as per local guidelines. See SCFT Thromboprophylaxis Guidelines - CG844

Following treatment of spinal cord compression, discussion with physiotherapy should be undertaken to assess the need for, and manage, a rehabilitation programme

6. Further Information

SCFT Clinical Guidelines:

6.1 Paediatric Spinal Cord Injury Pathway - CG1806

6.2 Analgesia in Malignant Disease (patients not receiving palliative care) - CG1463

6.3 Constipation Prophylaxis and Management - CG903

6.4 Tumour Lysis Syndrome - Prevention and Management – CG899

6.5 Thromboprophylaxis Guidelines - CG844

7. References

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