

## An Audit of the use of CT Myelography (CTM) in the evaluation of spinal lesions at the University Teaching Hospital, Zambia

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**Key words:** spine, spinal cord, x-ray Computed tomography, myelogram.

### Abstract

**Objective:** To evaluate the diagnostic value of the computer tomographic myelography (CTM) in patients with spine or spinal cord pathology.

**Design:** A retrospective study in 132 cases of CTM with clinical and radiological details in UTH between Jan, 2004 to Nov. 2006.

**Methods:** All the cases of CTM were performed on Philips CT Aura scanner, helical scan using 1.5mm to 5mm axial slices depending on spinal segment. Coronal and sagittal reconstructions were performed; soft tissue and bony windows were also displayed.

All patients came from in ward after keeping the patient in supine position for 4-6 hrs after intrathecal injection of 5-10ml Omnipaque contrast agent.

**Results:** There are 4 cases (4/132, ratio 3%) unsuccessful; the others including normal group (n=25, 20%) traumatic spine fracture (n=16, 12%), tumour (n=24, 18%) disc protrusion (n=28, 21%) inflammatory (n=23, 17%) spondylosis and other (n=12, 9%).

**Conclusion:** The CTM still plays an important role in places where the magnetic resonance imaging MRI is not available as in Zambia in diagnosing spinal diseases especially in patients with neurological deficits.

### Introduction:

The plain CT scan provides the capability of examining in detail not only the bone but also some segment of discs and soft tissue structures in and about the spine, including the facets, the neuroforamen, the thecal sac and nerve roots as they exist the thecal sac, the ligamentum flava and the vascular structures<sup>1</sup>. MRI is considered to be the first procedure of choice in the evaluation of the patient

with neurological deficits, but in institutions where MRI is not available or where MRI is inconclusive or technically inadequate, the CTM is still in use in evaluating the patient with spinal disease mainly with neurological deficits.

To evaluate the value of CTM in spinal diseases, 132 cases where CTM was performed, were taken for our study from January 2004 to November 2006 in University Teaching Hospital Lusaka, Zambia.

### Material and Method

One hundred and thirty two cases (97 male, 35 female) of CTM with the age range from 6 -59 years old (average- 35 years) were taken for the study from the period of Jan. 2004 to Nov. 2006 in UTH, Zambia. All patients came from admission wards of neurosurgery, neurology or orthopaedics. 5-10 millilitres water-soluble contrast (Omnipaque) was injected into the subarachnoid space either through the cervical or lumbar route depending on the site of lesion. Besides routine scan, delayed CTM

CT Scan Findings	No. of cases	%	Comments
Nomal	25	20	
Trauma	16	12	Spinal cord atrophy in 6 cases on long term follow
Disc	28	21	6 in cervical region and 22 discs in lumbar region
Tumour	24	18	6 in spine, 6 in spinal canal and 12 vertebral runour with
Inflamatory Infection	23	17	19 TB spine involving spinal cord and 5 spinal cord atrophy on long
Spondylylosis	12	9	Spinal canal stenosis in 8 cases
Unsuccessful	4	3	Technical error
Total	132		

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was also performed after 4 – 6 hours for the diagnosis of syrinx wherever it was required.

All the cases of CTM were performed on Philips CT Aura scanner, Helical scan using 1.5- 5mm thick axial slices with 1- 1.5 pitch according to different spinal segment. Coronal and sagittal reconstructions were performed in soft tissue and bony windows.

### Observations

Contents of the vertebral canal include the spinal cord, meninges and the epidural space. The epidural space contains fat and a richly anastomising plexus of veins. The meninges are composed of three cylindrical layers from superficial to deep be dura matter, arachnoid matter and pia matter. Potential and actual spaces exist at certain points in relation to these membranes and the spinal cord. The subdural space between dura and arachnoid is a potential space. These membranes are easily separated by pathologic fluids as seen with subdural haematoma or abscess. Subarachnoid spaces are a true space between the arachnoid and pia matter. It is filled with cerebrospinal fluid. There is no distinction between the spinal cord and subarachnoid space on plain CT or enhanced CT following intravenous contrast administration, but there is definite distinction of spinal cord from subarachnoid space on the CT scan after the intrathecal contrast injection.

CT Myelography has proven to be a useful adjunct in the radiographic evaluation of radiculopathy, neck pain, and back pain, the failed back syndrome, spinal infection metastatic disease and spinal trauma. The value of CTM in different spinal disease is as follows:

### Traumatic Lesions:

We observed 16 cases of spinal trauma. The advantages of CT in the evaluation of acute spinal trauma lesions have been well documented. Plain spinal CT is quick, safe, easy, comfortable, non invasive way to evaluate the spine without subjecting the patient to additional movement that may cause further damage, this is especially important in patients with severe spinal injuries.<sup>2</sup> However, the CTM could be needed in those patients who present with neurological deficits not only in post traumatic follow up, but also in some acute traumatic cases. Traumatic lesions that can be more fully evaluated with CTM are numerous. Cord swelling secondary to oedema or haemorrhage is better appreciated as thinning of the surrounding opacified subarachnoid space. Epidural haemorrhage/haematoma or associated traumatic disc herniation may be displayed as displacement of the cord/cauda associated with attenuation of the subarachnoid space (fig1). Total block may exist. Significant narrowing of the spinal canal with compression

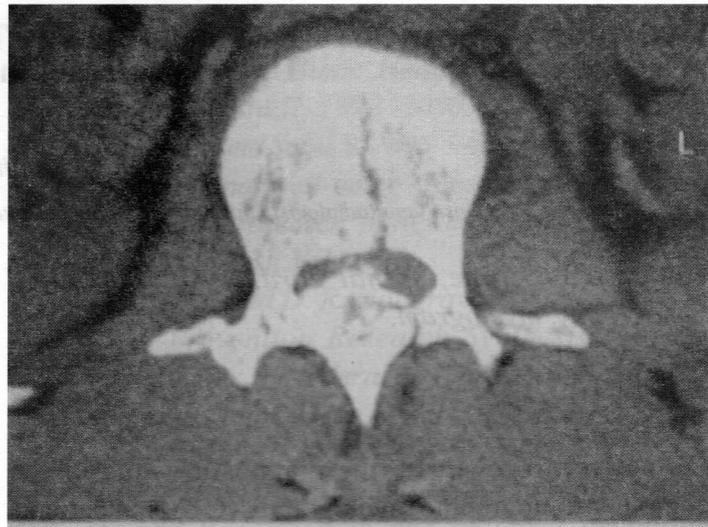


Fig 1. A case of road traffic accident: Shows linear fracture of body of vertebra and left lateral mass. An anterolateral epidural haematoma in spinal canal is compressing and displacing the spinal cord.

of the cord/cauda secondary to osseous encroachment from displaced fragments and subluxations is better visualized with this method. Finally, dural tears and nerve root avulsions in acute patient or follow up old traumatic case with syrinx or cord atrophy are more likely to be diagnosed with the use of CTM. It is very important to differentiate these entities. Haematomyelia is treated conservatively whereas an epidural haemorrhage usually requires more aggressive surgical treatment. Epidural haematomas can severely compress the cord or cauda equina with rapid progression of neurological symptoms. Surgical decompression is necessary or permanent neurological deficits can occur<sup>3</sup> it is important that delayed CTM in the long-term follow-up of a spinal injury patient whom suspected with syrinx development. If the syrinx is not directly communicating with spinal subarachnoid space, the myelographic contrast could be seen collecting



Fig 2 A long term follow up case of trauma shows cord atrophy on CTM.

cavity of syrxinx after 4- 6 hours of intrathecal injection. If time period exceed over 6 hours this might not provide adequate opacification of contrast in the subarachnoid space for CT examination.

In our study there are 6 cases of spinal cord atrophy in long term follow up (fig 2) of spinal cord trauma.

### **Tumour or Inflammatory Lesions:**

We have seen 24 cases of spinal tumours in our study. High resolution CT of the spine can be used reliably to visualize cortical bone destruction, calcified TB or tumour matrix, and soft tissue mass in the patient with tumour involving the posterior spinal structures. However, accurate delineation of the anatomic relationships of the tumours, including bone involvement, spinal canal or theca sac invasion and Para spinal soft tissue extension sometimes can not be obtained without intrathecal injection of non-ionic water-soluble contrast agents.<sup>4</sup> The involvement of subarachnoid space of spinal cord was clearly visible in 28



**Fig 3.** A case of paraplegia on CTM shows right epidural mass lesion displacing and compressing the dural sac, later on turned out to be lymphoma.



**Fig.4** Axial CTM of a case of TB spine: Destruction of body of vertebra: A hypo dense extradural mass in left posterolateral spinal canal is compressing and displacing the spinal cord to the right side.

cases (13 tumours, 15 TB) in our study (fig 3, 4). CT can provide almost similar information to MRI in diagnosing the space occupying lesions within the spinal canal. Where as CTM has still limitation in diagnosing any inflammatory disease with degenerative or demyelinating lesion of spinal cord.

### **Disc prolapse & spondylosis lesions**

Out of 28 cases in the present study, cervical region was involved in 6 cases and 22 discs were seen in lumbar region. Plain CT scan provides excellent information regarding bony abnormality and soft tissue pathology in lumbar disc lesions while same plain CT may be of limited use in evaluating the disc diseases in thoracic spine and the lower cervical canal due to beam hardening artefacts & significant differences in the attenuation coefficients of the canal content. Therefore CT myelogram is often used to permit more complete evaluation of the cord, spinal canal and its perimeter including the intervertebral disc for any region of the spine.

In this study, there are 6 patients with cervical disc protrusion clearly identified on CT myelogram but not adequately visible on plain CT scan. 22 cases of lumbar disc protrusion were compressing dural sac or nerve roots.

### **Summary**

This study shows the importance of CT myelogram in diagnosing the spine lesion with or without involvement of spinal canal or spinal canal occupying lesions. CTM is specifically good for the lesions in lower cervical and thoracic spine. CTM is of great value for the institutions where the MRI is not available.

However, the CTM should not be done in routine for the disc or degenerative lesion in lumbar region as plain CT can give excellent information on the merit of inherent intrinsic contrast of the body tissue in that particular region.

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