

Guidelines for imaging in adult patients suspected of having a cranial or spinal tumour

General principles:

- MRI is preferable to CT for cranial and spinal imaging when a tumour is suspected due to the higher sensitivity in demonstrating change as well as the lack of ionising radiation.
- CT is a reasonable alternative in emergency cases (particularly for cranial imaging) and where ionising radiation does not present a significant risk.
- Ideally CT scans should comprise a helical acquisition of the whole head pre and post contrast with 5 mm thick axial, coronal and sagittal reconstructions of both acquisitions.
- Contrast material should be administered (unless contraindicated) when a focal intracranial or spinal cord mass lesion or mass lesions are seen. The exceptions are vestibular schwannomas and pituitary adenomas which do not generally need contrast administration on MRI for the diagnosis to be established.
- Diffusion weighted imaging (if available on the scanner used) should be performed whenever a focal brain lesion / lesions are detected.
- Advanced MRI techniques such as perfusion imaging, spectroscopy and Diffusion Tensor Imaging (DTI) should be used when the supervising neuroradiologist thinks that it may add useful information in a particular case.
- Vascular imaging (CTA, CTV, MRA, MRV) may add useful information in selected cases but are not routinely performed.

Specific imaging protocols:

Protocol 1: Imaging for intracranial mass lesions (other than those specified in numbers 2 - 5 below)

MRI

All patients:

1. Axial T1 + T2 + DWI
2. Coronal FLAIR
3. Axial , coronal and Sagittal T1 Post Gadolinium or T1 volume FMSPGR with 3 plane reconstructions at 2mm slice thickness if done at 3T

Selected cases at the discretion of the radiologist / neuroradiologist:

1. MR spectroscopy
2. MR perfusion imaging
3. DTI
4. MRA
5. MRV

CT

1. Helical acquisition of the whole head pre- and post-contrast.
2. Axial, coronal and sagittal reconstructions at 5mm slice thickness of both the pre and post contrast acquisition.
3. Include high resolution thin (1mm or 2mm) bone algorithm reconstructions for tumours involving the cranial vault or skull base.

Protocol 2: Imaging of pituitary tumours

MRI

All patients

1. Axial T2 whole brain
2. Sagittal and coronal high resolution (3mm slice thickness) T1 through pituitary.

Selected cases:

1. Sagittal and coronal high resolution (3mm slice thickness) T1 post Gadolinium through pituitary in selected cases e.g. suspected Cushing's disease.
2. Dynamic contrast enhanced T1 coronal images through pituitary in selected cases where a pituitary microadenoma is strongly suspected but not seen on standard imaging

CT (when MRI is contraindicated):

1. Helical acquisition of whole head with reconstruction in all three planes at 3mm slice thickness using a soft tissue reconstruction algorithm
2. Use IV contrast at discretion of radiologist

Protocol 3: Imaging of tumours that involve the skull base, orbits or paranasal sinuses

MRI

All patients:

1. Axial high res (3mm slice thickness) T2 and T1
2. Coronal high resolution (3mm slice thickness) T1 and STIR
3. Axial and coronal high resolution (3mm slice thickness) T1 post gadolinium. Fat saturation is indicated when the orbits are involved and potentially for other tumours as well (at discretion of radiologist).

Selected cases: (at discretion of radiologist)

1. DWI
2. Axial T2 and/or FLAIR and/or whole brain T1 post gadolinium

CT (when MRI is contraindicated):

1. Helical acquisition of whole head with reconstruction in all three planes at 3mm slice thickness using a soft tissue reconstruction algorithm and at 1mm slice thickness using a bone reconstruction algorithm
2. Use IV contrast at discretion of radiologist – it would usually be indicated
3. CTA / CTV at discretion of radiologist

Protocol 4: Imaging for suspected vestibular schwannoma

MRI

Depending on scanner manufacturer, perform high resolution heavily axial T2 weighted images through IAM's (e.g. Balanced FFE, CISS or FIESTA)

CT (when MRI contraindicated)

Helical acquisition through posterior fossa.

Reconstruction in axial and coronal planes at 3mm slice thickness using a soft tissue reconstruction algorithm and at 1mm slice thickness using a bone reconstruction algorithm.

Protocol 5: Patients with NF2 or suspected NF2

MRI

Cranium:

Administer gadolinium at start of examination

1. Axial and coronal T1 whole head
2. Axial high resolution (3mm slice thickness) T1 post gadolinium. (fat-sat) to cover from foramen magnum to above orbits.
3. Axial balanced FFE or CISS or FIESTA (depending on scanner manufacturer) through cranial nerves III – 12 and cantered on the IAMs
4. Axial T2 whole head

Spine:

1. Sagittal T1 and T2 whole spine in 2 blocks
2. Coronal T1 and T2 whole spine in 2 blocks
3. Axial T2 and T1 through any area of potential cord or cauda equina compression

Protocol 6: Suspected spinal cord, filum terminale, spinal nerve-root or cauda-equina tumour

MRI

1. Sagittal T1 and T2
2. Axial T1 and T2
3. Post gadolinium sagittal and axial T1
4. Coronal T1 and T2 images at discretion of radiologist for tumours extending significantly through neural exit foramina.

CT (when MRI contraindicated)

1. Helical acquisition post IV contrast through relevant area of spine with reconstruction in axial, sagittal and coronal planes at 3mm slice thickness using a soft tissue reconstruction algorithm and at 2mm slice thickness using a bone reconstruction algorithm.
2. Consider CT Myelogram

Protocol 7: Suspected malignant spinal cord or cauda equina compression

MRI

1. Sagittal T1, T2 and STIR whole spine
2. Axial T1 and T2 through any area suspicious for malignancy
3. Post gadolinium sagittal and axial T1 at discretion of radiologist

CT (when MRI contraindicated)

1. Helical acquisition through relevant area of spine with reconstruction in axial, sagittal and coronal planes at 3mm slice thickness using a soft tissue reconstruction algorithm and at 2mm slice thickness using a bone reconstruction algorithm.
2. Consider CT Myelogram