CASE REPORT

Mobile ependymoma diagnosed with cine MRI

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SUMMARY

Migration of neurogenic spinal tumours is uncommon. However, such possible mobility should be kept in mind during surgery for neurogenic tumours whenever the lesion is not found at the anticipated level. Conventional static imaging techniques, such as myelography and MRI, have not documented dynamic motion of tumours. A 12-year-old boy was diagnosed with a neurogenic spinal tumour in the thoracolumbar region. To assess the migratory tendency of the tumour, cine MRI was performed to acquire dynamic images under postural change. Cine MRI showed that the tumour migrated up to the lower part of the T12 vertebra from the upper part of the L1 vertebra during a change in spinal posture from cervical flexion to extension. The tumour was completely removed and histological examination revealed the tumour to be an ependymoma. Cine MRI is useful for dynamically and non-invasively assessing the migratory tendency of spinal tumours.

BACKGROUND

Migration of spinal neurogenic tumours is uncommon.¹ Such possible mobility should be kept in mind during surgery whenever the lesion is not found at the anticipated level. Preoperative radiological imaging studies are useful to prevent excessive multilevel laminectomy and to minimise surgical morbidities. However, conventional static imaging techniques, such as myelography and MRI, have not documented the dynamic motion of mobile spinal tumours. We report a unique case of mobile cauda equina ependymoma diagnosed with cine MRI. To our knowledge, this is the first case of a mobile spinal tumour observed using preoperative dynamic imaging.

Figure 1 Preoperative MRIs. Sagittal T2-weighted MRI of the lumbar spine shows a mass lesion at the T12–L2 level (A). Enhanced MRI showing enhancement (B).

Figure 2 Position taking cine MRI. Patients are asked to slowly extend their head continuously from maximum flexion to maximum extension.

CASE PRESENTATION

A 12-year-old boy presented with progressive low back pain. No muscle weakness or sensory changes were noted. Conventional MRI showed an enhanced intraspinal elliptical mass dorsal to the conus at T12–L2 (figure 1).

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Video 1 Position taking cine MRI. Subjects were asked to slowly extend their head from maximum flexion to maximum extension.

To investigate the mobility of the tumour, cine MRI was planned to acquire dynamic images. For cine MRI, the patient was positioned in a supine position and an inflated beach ball was placed under the patient's neck and head, placing the cervical spine in an active cervical flexion position. Inflation of the ball was adjusted to reach maximum flexion and extension positions. The patient was asked to extend his head continuously from maximum cervical flexion to maximum cervical extension slowly for 30 s while midline sagittal images in the lumbosacral region were acquired every second. Maximal cervical extension simultaneously produces thoracic flexion (figure 2, video 1).

MRI imaging was performed using a 1.5 T MRI system with a 4-channel CTL array coil. Fast imaging employing steady-state acquisition (FIESTA) sequences (TR/TE=4.7/1.0 ms; flip angle, 50°; slice thickness, 8 mm; matrix, 256×256) were used. The tumour motion was animated and evaluated visually using a cineloop view of the sequential MRI. Cine MRI showed that the tumour migrated up to the lower part of the T12 vertebra from the upper part of the L1 vertebra during the change of spinal posture from cervical flexion to extension, while no motion of the spinal cord was found (figure 3, video 2).

TREATMENT

Following T12 and L1 right hemilaminectomies, the tumour was identified and excised from the filum terminale origin. The distal filum terminale attachments were cut. The tumour was totally removed in a piecemeal fashion and histological examination revealed it to be an ependymoma.

Figure 3 Cine MRIs. Cine MRI shows the upper border of the mass lesion at the upper part of the L1 vertebra in flexion (A); however, the mass moved up to the lower part of the T12 vertebra in a neutral (B) and extension position (C).

Video 2 Cine MR images. Cine MRI shows the upper border of the mass lesion at the upper part of the L1 vertebra in flexion. However, the mass moved up to the lower part of the T12 vertebra in a neutral and extension position.

OUTCOME AND FOLLOW-UP

The patient's back pain resolved.

DISCUSSION

A few cases of mobile intradural and extramedullary tumours have been reported.¹ The majority of mobile spinal tumours reported have been schwannomas.² In this respect, our case of mobile ependymoma is rare to the literature. Moon *et al*² reported the first case of a spinal ependymoma mobilised intraoperatively with the intentional use of a Valsalva manoeuvre under anaesthesia. Other mechanisms have been proposed in the literature for the mobility of extramedullary tumours, including laxity of the nerve root,³ postural changes⁴ and a cranial shift because of injection of intrathecal contrast medium during myelography.⁵ To prevent excessive multilevel laminectomy and surgical morbidity, preoperative diagnosis is important. However, it is difficult to preoperatively diagnose spinal tumour mobility using conventional imaging techniques such as myelography and static MRI.

Cine MRI is a technique used primarily in the field of cardiology. Because of its large field of view, operator independence, avoidance of radiation exposure and lack of geometric assumptions to estimate heart size, cardiac cine MRI is considered a

standard of reference for evaluation of cardiac mass, volume and function.⁶

In this report, preoperative cine MRI was used to assess the migratory tendency of a spinal tumour. In our patient, postural change could cause tumour mobility. Interestingly, while the tumour was mobile, the conus medullaris did not change its position. The decreased traction on the distal film terminale attached to the tumour during postural change may have moved the tumour upward. Although the mobility of the spinal tumour in this case was slight, the present technique can be helpful for dynamically and non-invasively assessing the migratory tendency of spinal tumours.

Learning points

- ▶ Preoperative cine MRI can confirm and evaluate the mobility of an intradural ependymoma.
- ▶ The present technique is useful for dynamically and non-invasively assessing the migratory tendency of spinal tumours.
- ▶ In our patient, postural change could have caused tumour mobility.

Contributors TK was involved in conception, design, acquisition of data and drafting of the manuscript. TK, TA and TS were involved in analysis and interpretation of data. AO was involved in study supervision and approved the final version of the manuscript. All authors critically reviewed the submitted article.

Competing interests None.

Patient consent Obtained.

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