Intradural spinal tumor

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- Machine learning-driven national analysis for predicting adverse outcomes in intramedullary spinal cord tumor surgery
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The most common spinal intradural tumor in Northern China is spinal schwannoma, followed by spinal meningioma and spinal ependymoma.

Types

Intradural extramedullary spinal tumor

Intramedullary tumor.

The most frequent intradural extramedullary tumors are meningiomas and neurinomas. Among the intradural-intramedullary tumors the most frequent ones are ependymomas and astrocytomas.

Clinical features

Independent of their origin, spinal tumors usually manifest with progressive local or radicular pain and neurological deficits.

The routine use of these scores in clinical practice and documentation is advised McCormick scale [1], Klekamp and Samii Score [2] Frankel grade [3].

Diagnosis

All intramedullary tumors showed swelling of the spinal cord itself. In all five extradural tumors a low intensity band was visualized between the spinal cord and tumor. On the other hand, a low intensity band was demonstrated in no cases with intradural tumors. Visualization of this low intensity band is important in differentiating extradural from intradural-extramedullary lesions. We call this low intensity band, “the extradural sign”. Signal intensity of intradural tumors varied with histology. In extramedullary tumors, signal intensity of schwannomas was similar to that of the cerebrospinal fluid

(CSF) both on T1 weighted (inversion recovery) and T2 weighted spin echo (SE) images. On the other hand, meningiomas tended to be isointense to the spinal cord on both T1 and T2 weighted SE images. They found relatively reliable signal characteristics to discriminate meningioma from schwannoma [4].

Treatment

see Intradural spinal tumor treatment.

Case series

Eighty-two patients with intradural tumors were treated and prospectively evaluated. The positioning deviations of the spine radiosurgery treatments in patients were recorded. Radiosurgery was delivered using a linear accelerator with a beam modulator and CBCT image guidance combined with a robotic couch that allows positioning correction in 3 translational and 3 rotational directions. To measure patient movement, 3 quality assurance CBCTs were performed and recorded in 30 patients: before, halfway, and after the radiosurgery treatment. The positioning data and fused images of planning CT and CBCT from the treatments were analyzed to determine intrafraction patient movements. From each of 3 CBCTs, 3 translational and 3 rotational coordinates were obtained. RESULTS The radiosurgery procedure was successfully completed for all patients. Lesion locations included cervical (22), thoracic (17), lumbar (38), and sacral (5). Tumor histologies included schwannoma (27), neurofibromas (18), meningioma (16), hemangioblastoma (8), and ependymoma (5). The mean prescription dose was 17 Gy (range 12-27 Gy) delivered in 1-3 fractions. At the halfway point of the radiation, the translational variations and standard deviations were 0.4 ± 0.5, 0.5 ± 0.8, and 0.4 ± 0.5 mm in the lateral (x), longitudinal (y), and anteroposterior (z) directions, respectively. Similarly, the variations immediately after treatment were 0.5 ± 0.4, 0.5 ± 0.6, and 0.6 ± 0.5 mm along x, y, and z directions, respectively. The mean rotational angles were 0.3° ± 0.4°, 0.3° ± 0.4°, and 0.3° ± 0.4° along yaw, roll, and pitch, respectively, at the halfway point and 0.5° ± 0.5°, 0.4° ± 0.5°, and 0.2° ± 0.3° immediately after treatment. CONCLUSIONS Radiosurgery offers an alternative treatment option for intradural spine tumors in patients who may not be optimal candidates for open surgery. CBCT image guidance for patient setup for spine radiosurgery is accurate and successful in patients with intradural tumors [5].

1)
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