



How Effective is Intensity-Modulated Radiation Therapy When Treating Patients with Emergency Metastatic Spinal Cord Compression?

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Commentary

Bone metastasis is one of the most common metastatic lesions in cancer patients. Spinal metastasis, in particular, is a more noticeable form of bone metastasis due to the symptoms and urgency of treatment. Spinal metastasis may cause neurological damage in addition to pain, which can lead to a dramatic deterioration of patient's quality of life owing to sensory changes, loss or lack of strength and rectal capacity with intestinal obstruction. It is a representative malady requiring an emergency treatment [1].

Spinal cord compression syndrome is a manifestation of the symptoms requiring such an emergency treatment caused by spinal metastasis. It is a symptom caused by the compression of spinal cord especially that of the epidural spinal cord with a tumor from bone metastasis. The most common causes of spinal cord compression syndrome due to bone metastasis are lung cancer and breast cancer. The most common involvement site is the thoracic region; the most common symptom is pain [2].

Steroids should be given first as a treatment upon diagnosis and surgery and/or radiotherapy should be performed depending on the extent of the compression of the spinal cord [3]. It is important to diagnose spinal cord compression syndrome early during the pain phase and to treat it early because the symptomatic pain may be accompanied by lower leg strength or sensory abnormality. It is of primary importance for patients and caregivers to be aware of pain, which is the initial indication of spinal cord compression syndrome, and to promptly notify the primary care physician when symptoms develop [4].

It is important to carefully observe changes in neurological symptoms in patients with bone metastasis, especially in patients with spinal metastasis. Immediate examination and appropriate treatment should be performed when symptoms are present. If radiotherapy is needed, based on the overall prognosis of the patient and extent of the disease, it is important to determine which type of radiation treatment to be used.

Recently, there have been attempts to use Stereotactic Body Radio Therapy (SBRT), using the Intensity-Modulated Radio Therapy (IMRT) and image-guided radiation therapy, to treat spinal cord compression syndrome (Figure 1). It is known that radiation therapy can also be repeated using IMRT techniques when the tolerance dose of the spinal cord is limited [5]. In particular, stability and efficacy have been reported not only in retreatment but also in primary care [6]. One year after treatment, the local control rate is reported to be approximately 80% to 85% [7,8].

Although various radiotherapy techniques have been developed in patients with spinal cord metastasis with or without spinal cord compression syndrome, it is very important to determine the appropriate radiation therapy technique while considering the extent of disease progression and the patient's survival. In IMRT, the time from treatment planning to the start of radiation therapy may be several days longer compared with conventional two- or three-dimensional radiation therapy techniques. Therefore, in all patients with spinal metastases, IMRT should not be performed. In the case of SBRT in particular, both treatment plans and quality verification process to be essentially included. Because of this, initiation of a treatment delayed in even one or two days may adversely affect the prognosis of the quality of life for the patient. In the case of spinal cord compression syndrome, radiotherapy is to be needed as quickly as possible.

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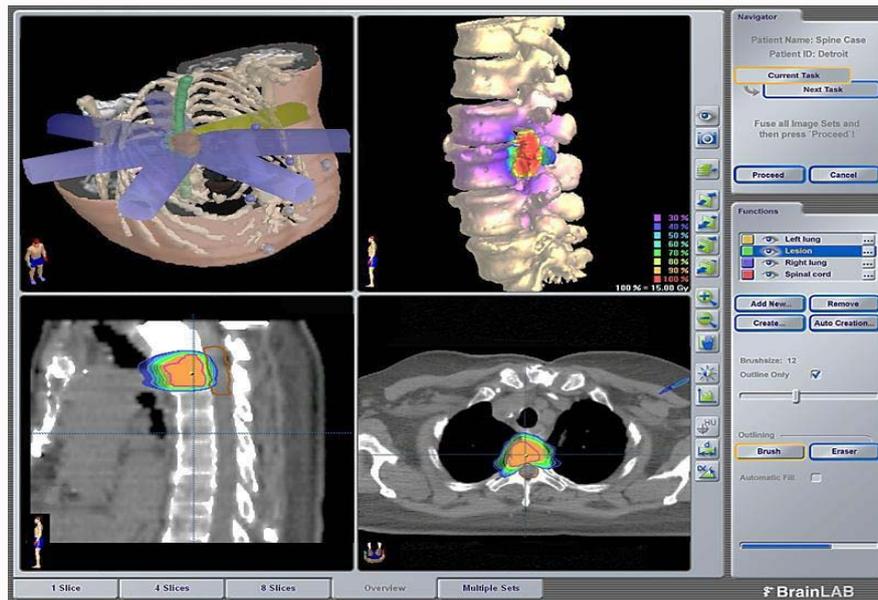


Figure 1: Stereotactic Body Radio Therapy (SBRT) based on Intensity-Modulated Radiation Therapy (IMRT) planning for spine metastasis.

Actual treatment planning time alone may not be significantly different from that of three-dimensional conformal radiotherapy [9]. However, in order to perform SBRT for spinal cord compression using the IMRT technique, consideration must be given to additional radiologic imaging such as spine MRI to facilitate accurate contouring for target and normal cells in tissues such as the spinal cord, as well as to take into account the time for contouring, treatment planning, and quality assurance. In such cases, the difference in time will be longer.

Even when using the latest RT technique, if the appropriate patient selection is not achieved, the cost and hospital stay period for the patient may be increased without improving the treatment efficiency.

The use of IMRT, which has excellent efficacy in protecting normal tissues, especially in those of the spinal cord during treatment, also enhances the probability of tumor control; an improved treatment response including complete remission that could not have been expected from conventional three-dimensional radiotherapy can be attained. However, compared to three-dimensional or two-dimensional radiotherapy, IMRT takes a relatively longer time from the beginning of treatment planning to the start of treatment. It is unsatisfactory that it becomes a determining factor for the use of such an important treatment method. The length of time from the treatment plan to the start of treatment is considered to be an important factor in the determination of the treatment method because the time to the start of treatment is important in determining the quality of life of patients with spinal cord compression syndrome. From that point of view, the choice of IMRT may have a disadvantage.

There is a question as to whether surgery or SBRT should be performed first for the patient with spinal cord compression syndrome. According to Samuel et al. [10], in the case of grade IV or V epidural compression, urgent treatment for spinal cord compression is especially important and surgery should be considered. If surgery is not possible, radiotherapy is needed. It may be better to perform two- or three-dimensional radiotherapy than to perform SBRT using an IMRT. It is also reported that if patients are not selected carefully, the risk of disease relapse, especially the occurrence of epidural disease,

myelopathy and vertebral compression fracture, increases [11]. Considering this, more sophisticated indications for IMRT for spinal cord compression are needed, and we hope to see this issue resolved in the future. We also expect to improve radiotherapy techniques, including the IMRT. This would maintain the existing treatment effect while reducing the treatment planning time compared to the existing two-dimensional or three-dimensional radiation treatment techniques.

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