

Tumor Surgery With High-Dose Stereotactic Radiosurgery Effective

Researchers from Memorial Sloan-Kettering Cancer Center have found that tumor "separation surgery" followed by high-dose hypofractionated stereotactic radiosurgery (SRS) or high-dose single-fraction SRS is safe and effective in controlling spinal metastases, regardless of the radiosensitivity of the particular tumor type that has invaded the spine. This finding is fleshed out in the article *Local Disease Control For Spinal Metastases Following 'Separation Surgery' And Adjuvant Hypofractionated Or High-Dose Single-Fraction Stereotactic Radiosurgery: Outcome Analysis in 186 Patients*. Clinical article, by Ilya Laufer, M.D., and colleagues, published online in the *Journal of Neurosurgery: Spine*.

The authors reviewed and analyzed data in the charts of 186 patients who presented with epidural spinal cord compression due to spinal metastases. All of these patients underwent tumor separation surgery to decompress the spinal cord and stabilize the spine sometime between 2002 and 2011. During this procedure the tumor was dissected away from the spinal cord—or separated—providing a space between the spinal dura and any remaining tumor. Unlike in traditional spinal tumor surgery, extensive tumor resection was not pursued to reduce surgical morbidity. The spine was also stabilized with screws and rods.

Within two to four weeks after surgery, stereotactic radiosurgery (SRS) was performed to deliver radiation to the remaining metastatic tumor without damaging the spinal cord. In 40 patients (21.5 percent) radiation was delivered in a single 24-Gray (Gy) dose to the tumor (high-dose single-fraction SRS). In 37 patients (19.9 percent) a median total dose of 27 Gy (range 24 to 30 Gy) was delivered in three fractions (high-dose hypofractionated SRS), and in 109 patients (58.6 percent) a median total dose of 30 Gy (range 18 to 36 Gy) was delivered in five or six fractions (low-dose hypofractionated SRS). In their review and analysis, the authors identified the following:

- Better local tumor control in patients who underwent high-dose hypofractionated SRS than in those who underwent low-dose hypofractionated SRS.
- The one-year cumulative local progression rates were 4.1 percent in the high-dose group and 22.6 percent in the latter group.
- The difference in tumor progression-free survival between these two groups was statistically significant.
- In the group of patients who underwent single-fraction SRS, the 1-year cumulative local progression rates was nine percent.
- There was no statistically significant difference in tumor progression-free survival between this group and the high-dose hypofractionated SRS group.
- Other variables were examined to determine their effect on local tumor

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control, specifically individual patient characteristics, radiosensitivity of the metastatic tumor to conventional radiation, response to preoperative radiotherapy, grade of spinal cord compression and extent of spinal cord decompression.

- None of these variables significantly correlated with progression-free survival.
- This lack of correlation confirms that the "tumor response to high-dose radiation is independent of these characteristics."

Unlike conventional external beam radiation therapy, SRS delivers a far more focused beam of radiation to the tumor. This allows physicians to deliver large doses of radiation to diseased portions of the body and still protect surrounding healthy tissue from radiation's effects. The authors point out that radiosensitive tumors can be treated successfully with lower doses of radiation delivered by conventional external beam radiation therapy. Radioresistant tumors, on the other hand, require large doses of radiation, which are best delivered by SRS. By first performing "separation surgery," creating a space between the spine and the remaining tumor, the surgeons protect the spinal cord from the high levels of radiation needed to treat radioresistant tumors.

The authors begin their paper by stating the rationale behind treatment of metastatic spine tumors. Care "is palliative with the goal of improving or maintaining neurological function, achieving spine stability, relieving pain and providing durable tumor control." The object is to make the patient as comfortable and neurologically functional as long as possible despite the presence of systemic disease. In this situation sometimes less surgery is better.

According to co-author Dr. Mark Bilsky, "The strategy of separation surgery followed by high-dose hypofractionated or single-fraction radiation has revolutionized our ability to provide meaningful palliation for this very complicated patient population with metastatic spine tumors. This limited surgery consisting of spinal cord decompression and posterior segmental fixation is well tolerated and can be performed with limited morbidity.

"Instead of attempting gross total resection followed by conventional external beam radiation, separation surgery followed by SRS provides excellent durable tumor control of residual vertebral body tumors and even large paraspinal tumors, while minimizing the extent of surgical intervention. The integration and wide availability of SRS as a post-operative adjuvant following separation surgery will help shift treatment paradigms for metastatic spine tumors to ultimately provide better palliation for these patients."

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