Stereotactic Radiosurgery for Sarcoma

Ekkehard Kasper* and Anand Mahadevan
Department of Neurosurgery and Radiation Oncology, Beth Israel Deaconess Medical Center and Harvard Medical School, USA

EDITORIAL

The primary treatment of most sarcoma patients is surgery. The wider the excision, the lower the probability of local failure. For typical cases of non-CNS disease, adjuvant RT is offered in most cases in addition to surgery to optimize local control. However, bone and soft tissue sarcoma is historically considered a “radioresistant” tumor because conventionally fractionated radiation treatments have not been shown to be effective as primary treatment for this disease.

Sarcomas can be divided, broadly, into primaries in bone and those arising in soft tissues. They can present at any age, but the age range and site within the body on presentation vary with the histological type, as do the natural history and sensitivity to chemotherapy and radiotherapy. The majority of primaries are in the limbs although there are substantial subgroups within the abdomen and pelvis, base of skull, spine and head and neck.

Histologies such as osteosarcoma, Ewing’s, and rhabdomyosarcoma in the young have a high risk of metastatic disease at presentation, with clear benefit for the use of intensive chemotherapy regimens. In contrast, the natural course of chondrosarcoma and chordoma is dominated by local regional failure and dissemination tends to be a late manifestation and chemotherapy, at present, has no prominent role in these two types. Soft tissue sarcoma of adult type is somewhat intermediate, with 30-70% eventually manifesting metastases and intermediate chemosensitivity.

While local control is dose dependent, delivery of high doses of radiation is limited by the tolerance of normal tissue surrounding the tumor. So the question arises, what our therapeutic options are with those different subtypes of sarcoma for which radical surgery cannot be undertaken and chemotherapy is considered ineffective- especially once the CNS is affected.

The development of radiosurgery – allowing an accurate delivery of high doses of radiation to a tumor while maximally sparing surrounding normal organs – may allow the radio resistance of sarcomas to be overcome. Thus far, the published albeit limited clinical experience using radiosurgery to treat metastatic sites of sarcoma as well as early experience using radiosurgery for primary unrespectable sarcomas appears promising[1].

The most common site for metastatic disease is the lung, with bone being less common; intracranial metastases are signs of late stage disease, uncommon and are rarely isolated. Cerebral metastases are extremely uncommon in sarcoma [2].

There is a small literature on the use of radiosurgery for primary management of CNS metastasis from sarcoma. Most series suggest equivalent local control to that of other tumor types. One study of 21 patients with intracranial disease treated with single fraction radiotherapy (mean volume of 6.2cc, and median marginal dose of 16Gy) reported 88% local control with 1 year survival of 61% but high incidence of subsequent other intracerebral lesions with or without whole brain radiotherapy [3]. However in another study, patients with sarcoma (median volume 1.6cc, median marginal dose 18Gy) did significantly worse than other relatively resistant types, possibly because of the high incidence of developing subsequent lesions outside the treatment field [4].

For this difficult scenario, we consider aggressive local surgical resection for non eloquent areas indicated whenever possible which should be followed by postoperative radiosurgery. Alternatively, primary SRS as an alternate therapy in the setting of eloquent areas or non-resectability of deep seated lesion can achieve good local control, and prolong patient survival considerably in the setting of modern multi-disciplinary systemic management of metastatic sarcoma. To this end, we present 8 cases here illustrating the role of SRS in the management for CNS sarcoma metastasis [5].

REFERENCES


