Cureus

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Abstract

Risk of Vertebral Compression Fractures in Long-term Survivors After Stereotactic Radiosurgery for Spine Metastases

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Categories: Neurosurgery, Radiation Oncology
Keywords: stereotactic radiosurgery, srs

How to cite this abstract
Ling D, Flickinger J C, Burton S A, et al. (November 02, 2017) Risk of Vertebral Compression Fractures in Long-term Survivors After Stereotactic Radiosurgery for Spine Metastases. Cureus 9(11): a247

Abstract

Objectives: Vertebral compression fracture (VCF) is potentially disabling sequelae of spine radiation therapy. The reported risk of VCF following stereotactic radiosurgery (SRS) for the primary treatment or re-irradiation of spinal metastases ranges from 6-39%, although follow-up in most series is limited to 1-2 years. Our aim was to document the 5- and 10-year incidence of vertebral compression fracture in long-term survivors following SRS for spine metastases.

Methods: A single-institution retrospective review was completed on 562 patients treated with SRS for spine metastases between April 2001 and July 2011. Selecting those with a minimum of 5-year survival after SRS resulted in 43 patients who collectively underwent 84 treatments at 51 spine sites. The incidence of de novo VCF or progression of pre-existing VCFs occurring in the absence of tumor progression was recorded. Binary logistic regression was used to identify potential predictors VCF. The Kaplan-Meier method was used to analyze the actuarial rate of VCF.

Results: Median follow-up per treatment site was 81 months (range: 60-133). Most were treated with single-fraction SRS to a median dose of 16 Gy (range: 12-24), and 31 (61%) sites had been treated with prior external beam radiation therapy to a median total biologic equivalent dose (BED)3 of 60 Gy (range: 27-131) with a median re-irradiation interval of 12.3 months (range: 0.9-145). Nine (18%) lesions were managed with kyphoplasty for a pre-existing pathologic fracture prior to SRS. Of 51 sites treated, a total of 9 (17.6%) vertebral compression fractures occurred at a median time of 18 months (range: 3-57 months), with 5- and 10-year VCF rates of 16% and 16%, respectively. Seven (78%) vertebral compression fractures occurred de novo, and 2 (22%) were progression of a pre-existing fracture. Eight fractures (89%) were symptomatic with pain, and 5 (56%) required surgical stabilization with kyphoplasty (n=4) or posterior spinal fusion (n=1). Age, gender, primary tumor type, sclerotic vs. lytic lesion type, presence of pre-existing compression fracture, SRS dose, cumulative BED of all prior treatments, and gross tumor volume did not predict subsequent vertebral compression fracture.

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Published 11/02/2017

Conclusions: SRS for the primary treatment or re-irradiation of spinal metastases is associated with a moderate risk of VCF up to 5 years following treatment, with a plateau in incidence thereafter up to 10 years. No predictors for late development of VCF were identified.