Cureus

Oncologic Outcomes and Safety After Spinal Re-Irradiation with Stereotactic Body Radiation Therapy

Open Access
Abstract
Published 03/06/2024

Copyright
© Copyright 2024
Patel et al. This is an open access abstract distributed under the terms of the Creative Commons Attribution License CC-BY 4.0., which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Distributed under
Creative Commons CC-BY 4.0

Palak Patel [1], Michael LeCompte [1], Daniel Lubelski [2], Khaled Kebaish [3], Ali Bydon [4], Nicholas Theodore [5], Sang H. Lee [6], Lawrence R. Kleinberg [7], Bin Wu [8], Kristin J. Redmond [9]

1. Radiation Oncology, Johns Hopkins School of Medicine, Baltimore, USA 2. Neurosurgery, Johns Hopkins School of Medicine, Baltimore, USA 3. Orthopedic Surgery, Johns Hopkins School of Medicine, Baltimore, USA 4. Department of Neurosurgery, The Johns Hopkins University School of Medicine, Baltimore, USA 5. Neurosurgery, Johns Hopkins Hospital, Baltimore, USA 6. Orthopedic Surgery, John Hopkins University Hospital, Baltimore, USA 7. Radiation Oncology, The Johns Hopkins University School of Medicine, Baltimore, USA 8. Biophysics and Biophysical Chemistry, Johns Hopkins School of Medicine, Baltimore, USA 9. Radiation Oncology and Molecular Radiation Sciences, The Johns Hopkins University School of Medicine, Baltimore, USA

Corresponding author: Palak Patel, palakppatel97@gmail.com

Categories: Medical Physics, Radiation Oncology
Keywords: stereotactic body radiation therapy

How to cite this abstract
Patel P, LeCompte M, Lubelski D, et al. (March 06, 2024) Oncologic Outcomes and Safety After Spinal Re-Irradiation with Stereotactic Body Radiation Therapy. Cureus 16(3): a1140

Abstract

Objectives:

Management of spinal metastases that fail radiation therapy is a challenge, presenting a fine balance between the risk of pain and neurologic deficits if the tumor is not controlled and the increased risks associated with exceeding the tolerance of the spinal cord and other adjacent critical structures. Data regarding SBRT in the re-irradiation setting is limited. The purpose of this study was to report oncologic outcomes and toxicities for patients that received re-irradiation using SBRT.

Methods:

Patients treated with spine SBRT for re-irradiation to target the overlapped or abutted a previous conventional RT or SBRT field at a single institution between 2010 and 2021 were retrospectively reviewed. The cumulative constraint to the neural avoidance structures were a BED3 ⩽75 Gy (above the conus) or ⩽106 Gy (below the conus) accounting for 25% repair at 6 months and 50% repair at 1 year following the first course of RT. Radiographic local recurrence was defined as progressive disease on CT and/or MRI in the treatment volume or at the margin of the treatment field compared with imaging studies before SBRT. Cumulative incidence of local recurrence (LR) was reported with death as a competing event, and overall survival (OS) was estimated with Kaplan-Meier. Toxicity grades were determined according to NCI CTCAE version 4.0.

Results:

Ninety patients (225 vertebrae) with a median age of 56.5 years (range: 27-84 years) were included in the analyses. The most common histologies were NSCLC (17.7%), kidney (15.6%), prostate (14.4%), and breast (7.8%). The majority (51.1%) of metastases were in the T-spine, while 31.1% were in the L-spine and 13.3% in the C-spine. The median prescription dose was 27 Gy (range: 14-40 Gy) in a median of 3 fractions (range: 1-5). The median prescription isodose line was 59% (range: 48%-97%). The median time to reirradiation with SBRT was 14 months (range: 1-89 months) and most common prior spinal radiation dose was 30 Gy (range: 8-50 Gy) in a median of 5 fractions (range: 1-15). The median BED3 to the spinal cord from prior radiation was 52.6 Gy and from SBRT reirradiation was 31.8 Gy. The median follow-up was 8.7 months (range: 0.4-43.9 months). The 6-month, 1-year, and 2-year local control rates were 88.9%, 83.4%, and 78.9%, respectively. Only 6.7% of patients underwent salvage surgery, at a median of 9 months after SBRT. The median overall survival was 14.0 months, and overall survival was 54.4% at 1 year and 27.8% at 2 years post-SBRT. All toxicities were grade < 2 and no patients developed spinal cord myelopathy.

Conclusion(s):

These data suggest excellent local control and low toxicity following SBRT for reirradiation of spinal metastases. Future prospective and multi-institutional studies are needed to explore the optimal dose fractionation regimen and cumulative normal tissue constraints to maximize local control and minimize toxicity.