Stereotactic body radiotherapy

see also Robotic stereotactic body radiotherapy

Stereotactic body radiotherapy (SBRT) is a type of radiation therapy that is used to treat cancer by delivering high doses of radiation to a precise target in the body. It is also known as stereotactic ablative radiotherapy (SABR).

SBRT uses advanced imaging techniques, such as CT scans or MRI, to create a detailed 3D map of the tumor and its surrounding tissues. This information is used to calculate the exact location and shape of the tumor, allowing the radiation beams to be directed with extreme precision to the tumor while minimizing exposure to healthy tissues and organs.

The high doses of radiation used in SBRT are delivered over a small number of treatment sessions, typically 1 to 5 sessions, compared to the several weeks required for conventional radiation therapy. This short treatment course reduces the overall treatment time and may improve treatment outcomes for some types of cancer.

SBRT is commonly used to treat early-stage lung cancer, prostate cancer, liver cancer, and certain types of spinal tumors. It may also be used to treat metastatic cancer that has spread to other parts of the body.

Like other forms of radiation therapy, SBRT carries certain risks and side effects, such as fatigue, skin reactions, and damage to nearby healthy tissues. However, studies have shown that SBRT is generally safe and effective for treating certain types of cancer, particularly when used in combination with other cancer treatments.

Moore-Palhares et al. designed a 30 Gy in 4 fractions stereotactic body radiotherapy protocol, as an alternative option to our standard 2-fraction approach, for primarily large volume, multilevel, or previously radiated spinal metastases.

Objective: To report imaging-based outcomes of this novel fractionation scheme.

Methods: The institutional database was reviewed to identify all patients who underwent 30 Gy/4 fractions from 2010 to 2021. Primary outcomes were magnetic resonance-based vertebral compression fracture (VCF) and local failure per treated vertebral segment.

Results: We reviewed 245 treated segments in 116 patients. The median age was 64 years (range, 24-90). The median number of consecutive segments within the treatment volume was 2 (range, 1-6), and the clinical target volume (CTV) was 126.2 cc (range, 10.4-863.5). Fifty-four percent had received at least 1 previous course of radiotherapy, and 31% had previous spine surgery at the treated segment. The baseline Spinal Instability Neoplastic Score was stable, potentially unstable, and unstable for 41.6%, 51.8%, and 6.5% of segments, respectively. The cumulative incidence of local failure was 10.7% (95% CI 7.1-15.2) at 1 year and 16% (95% CI 11.5-21.2) at 2 years. The cumulative incidence of VCF was 7.3% (95% CI 4.4-11.2) at 1 year and 11.2% (95% CI 7.5-15.8) at 2 years. On multivariate analysis, age ≥68 years (P = .038), CTV volume ≥72 cc (P = .021), and no previous

surgery (P = .021) predicted an increased risk of VCF. The risk of VCF for CTV volumes <72 cc/≥72 cc was 1.8%/14.6% at 2 years. No case of radiation-induced myelopathy was observed. Five percent of patients developed plexopathy.

30 Gy in 4 fractions was safe and efficacious despite the population being at increased risk of toxicity. The lower risk of VCF in previously stabilized segments highlights the potential for a multimodal treatment approach for complex metastases, especially for those with a CTV volume of ≥72 cc [1)]

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Moore-Palhares D, Sahgal A, Zeng KL, Myrehaug S, Tseng CL, Detsky J, Chen H, Ruschin M, Atenafu EG, Wilson J, Larouche J, da Costa L, Maralani PJ, Soliman H. 30 Gy in 4 Stereotactic Body Radiotherapy Fractions for Complex Spinal Metastases: Mature Outcomes Supporting This Novel Regimen. Neurosurgery. 2023 Apr 19. doi: 10.1227/neu.0000000000002498. Epub ahead of print. PMID: 37074052.