



# The Risk of Vertebral Compression Fracture (VCF) Post-spine Stereotactic Body Radiotherapy (SBRT) and Evaluation of The Spinal Instability Neoplastic Score (SINS)

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## Introduction

Spine stereotactic body radiotherapy (SBRT) is an emerging therapy for patients with spinal metastases

Paradigm shift from treating patients with low dose conventional radiation to high dose radical radiation

Increasing late toxicities are radiation myelopathy (rare) and vertebral compression fracture (VCF)

Previous studies in VCF risk: Memorial Cancer Center (MKSCC) - 39%; MD Anderson (MDACC) – 20%

The aim of this study is to:

Report rate of VCF in patients treated with spine SBRT at the University of Toronto

Used the newly developed SINS criteria to assess baseline factors predictive of VCF and dosimetric data from the radiation plans

## Methods

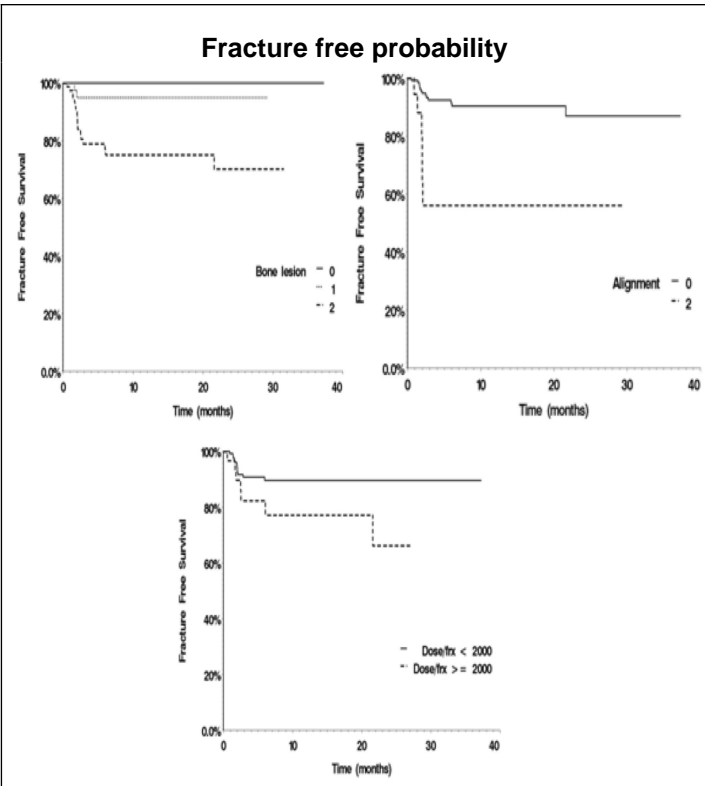
180 patients treated between 2007 to 2011 from a prospective database of spine SBRT  
Exclusion criteria: prior surgery and tumor recurrence

Final cohort: 90 patients and 167 spinal segments

Each vertebral segment treated was scored according to SINS

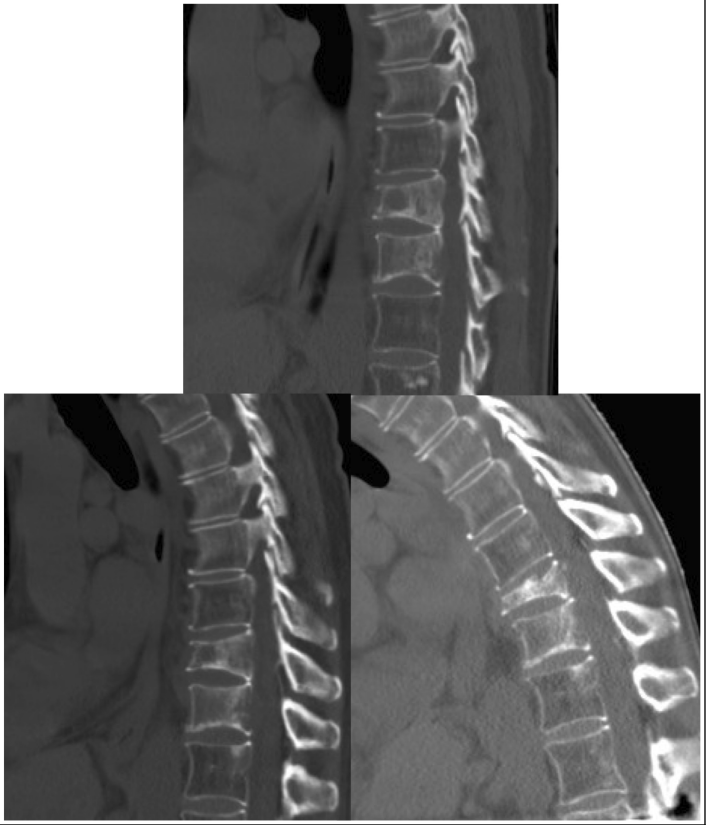
## Results

19 VCF (11%)  
12 de novo (63%)  
7 progressions (37%)  
Actuarial 1 year fracture free probability (FFP)=87.3%  
Mean/Median time to fracture: 3.3/2 months (0.5-21.6)



Predictive analysis		
FACTOR	UNIVARIATE P VALUE	MULTIVARIATE P-VALUE/HAZARD RATIO (95%CI)
Alignment (Normal vs. Kyphosis/Scoliosis)	< 0.0001	0.0003 /0.09 (0.024-0.33)
Type of Lesion (Mixed vs. Lytic*)	0.0003	0.007 /0.082 (0.017-0.386)
Vertebral body collapse (None vs. <50% vs. >50%)	0.009	NSIG
Histology	0.02	Lung: 0.03/4.3 (1.2-16) HCC: 0.0001/34(6.0-192.5)

## VCF after SBRT



## Conclusions

>/=20 Gy/frx increased the risk of VCF  
Pathophysiologically: We hypothesize radiation necrosis of the bone/tumor tissue is causing instability and VCF

Based on the original 6 SINS criteria

Lytic tumor and deformity (kyphosis/scoliosis)  
Further analysis is required to determine the role of histology

Liver and lung primary tumors are at higher risk of VCF

Future directions: Joint analysis with MDACC AND MSKCC to combine data