Spinal Instability Neoplastic Score

- Spinal Instability Neoplastic Score as a Predictor of Vertebral Fracture in Patients Undergoing Radiation Therapy for Spinal Metastases: A Single-Institution Study
- Sacral fracture risk after stereotactic spinal radiosurgery: a multi-institution, retrospective analysis
- Generalizable model to predict new or progressing compression fractures in tumor-infiltrated thoracolumbar vertebrae in an all-comer population
- Influence of Wearing Corsets During Radiation Therapy in Patients With Thoracic or Lumbar Spinal Bone Metastases
- Risk factors for mechanical complications following spondylectomy of thoracolumbar primary spinal column tumors
- Time is Spine: A Novel Radiology Reporting System for Optimizing Spine Oncology Decision-Making and Reducing Time to Treatment
- Role of Denosumab in Patients with Intermediate Spinal Instability Neoplastic Score (SINS)
- Expanded analysis of vertebral endplate disruption and its impact on vertebral compression fracture risk

Assessment of spinal stability in spine metastases is challenging and is mostly done by relying on clinical experience, in the absence of validated guidelines or an established predetermined set of risk factors. The Spinal Instability Neoplastic Score (SINS) provides clinicians with a tool to assess tumor-related spine instability.

Element of SINS	Score
Location	
Junctional (occiput-C2, C7–T2, T11–L1, L5–S1)	3
Mobile spine (C3–C6, L2–L4)	2
Semi-rigid (T3–T10)	1
Rigid (S2–S5)	0
Pain relief with recumbency and/or pain with movement/loading of the spine	
Yes	3
No (occasional pain but not mechanical)	1
Pain free lesion	0
Bone lesion	
Lytic	2
Mixed (lytic/blastic)	1
Blastic	0
Radiographic spinal alignment	
Subluxation/translation present	4
De novo deformity (kyphosis/scoliosis)	2
Normal alignment	0
Vertebral body collapse	
>50% collapse	3
<50% collapse	2
No collapse with >50% body involved	1
None of the above	0
Posterolateral involvement of the spinal elements (facet, pedicle or CV joint fracture or replacement with tumor)	
Bilateral	3
Unilateral	1
None of the above	0

Treatment and prognosis

The total score is calculated from the parameters above and the following outcomes are inferred:

score 0-6: stable

score 7-12: potentially unstable

score 13-18: unstable

A SINS of 7-18 warrants surgical consultation to assess for instability prior to proceeding with any planned radiation treatment.

Assessment of spinal stability in spine metastases is challenging and is mostly done by relying on clinical experience, in the absence of validated guidelines or an established predetermined set of risk factors. The Spinal Instability Neoplastic Score (SINS) provides clinicians with a tool to assess tumor-related spine instability.

A total of 110 patients were included in this retrospective study. Time to event was calculated as the difference between start of radiotherapy and date of occurrence of an adverse event or last follow-up, with death being considered a competing event. A competing risk analysis was performed to estimate the effect of the SINS on the cumulative incidence of the occurrence of an adverse event.

Sixteen patients (15%) experienced an adverse event during follow-up. The cumulative incidence for the occurrence of an adverse event at 6 and 12 months was 11.8% (95% confidence interval 5.1%-24.0%) and 14.5% (95% confidence interval 6.9%-22.2%), respectively. Competing risk analysis showed that the final SINS classification was not significantly associated with the cumulative incidence of an adverse event within the studied population.

The clinical applicability of the SINS as a tool to assess spinal instability seems limited.

LEVEL OF EVIDENCE 3. [1)]

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.

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.

They 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 [2)].

1)
Bollen L, Groenen K, Pondaag W, van Rijswijk CSP, Fiocco M, Van der Linden YM, Dijkstra SPD. Clinical Evaluation of the Spinal Instability Neoplastic Score in Patients Treated With Radiotherapy for Symptomatic Spinal Bone Metastases. Spine (Phila Pa 1976). 2017 Aug 15;42(16):E956-E962. doi: 10.1097/BRS.0000000000002058. PubMed PMID: 28800570.
2)
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.