The Spinal Instability Neoplastic Score is Predictive of Instability Necessitating Surgical Intervention: An External Validation Study

Hannah A. Levy[1], Zachariah William Pinter[2], Breydan Hawkins Wright[1], Mikaela H Sullivan, Brandon Paul McMaster, Giorgos D. Michalopoulos, Ahmad Nassr, Arjun Sebastian, Peter S Rose[1], Bradford L Currier
[1]Mayo Clinic, [2]Mayo Grad School of Medicine

INTRODUCTION: The spinal instability neoplastic score (SINS) is a consensus-derived classification originally intended to guide oncologists and other medical providers regarding when it is appropriate to refer patients with metastatic spinal disease to a spine surgeon. Despite its popularity, evidence-based assessments of this score's external validity are scarce. This study aims to investigate the value of the SINS score in predicting need for surgery in real-world practice.

METHODS: All patients with metastatic spinal disease diagnosed from 2013 to 2019 in a single quaternary referral center, with>1-month life expectancy, and available CT or MRI studies were included in this analysis. Observations were divided into three groups by SINS scores based on prior literature: 0-6 (stable), 7-12 (potentially unstable), 13-18 (unstable). The external validity of SINS to predict indication for surgery as per spine surgeons was measured via area-under-the-curve (AUC) of a Receiver Operating Characteristic curve. Kaplan-Meier analysis was performed to compare the hazard of need for surgery between groups.

RESULTS: A total of 127 patients with 385 metastatic lesions were included in this cohort. The mean patient age was 63.7±12.4 years, and 39.4% of the patients were of female sex. Sixty patients (47.2%) were referred to a spine surgeon after diagnosis, and 32 (25.2% of the total cohort) were offered surgery, of which four elected not to undergo surgery. In the per-lesion analysis, the mean SINS score was 5.3±2.8 – distribution presented in **Figure 1A**. The three groups had significantly different surgical indication rates (2.2% vs. 19.3% vs. 57.1%, p<0.01), with lesions of higher SINS being associated with a significantly higher hazard of need-for-surgery (p<0.01, **Figure 1B**). The AUC of SINS to predict surgical indication was 0.87 (95%CI: 0.80-0.94). Radiotherapy and interventional procedures (vertebroplasty / kyphoplasty / nerve ablation) were more commonly offered in potentially unstable compared to stable lesions (55.0% vs. 29.4%, and 11.9% vs. 2.6%, respectively, p<0.01).

DISCUSSION AND CONCLUSION: The SINS score is a valuable tool in the assessment of spinal instability in patients with spinal metastases, and it is associated with excellent accuracy in predicting need-for-surgery in real-world practice. Unstable lesions (SINS 13-18) are more likely to be offered surgery, while potentially unstable lesions (SINS 7-12) are more likely to be offered radiotherapy or interventional procedures.