

Sp43: What are the radiographic or imaging predictors of developing instability or deformity in the setting of vertebral osteomyelitis?

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Response/Recommendation:

Based on available data, radiographic and imaging predictors are essential for assessing spinal instability in infections. Scoring systems such as SITE, SISS, SINS, and BSDS provide structured evaluation criteria, with radiological findings playing a pivotal role.

Key imaging-based instability predictors include:

- 1) **Location:** Instability risk is highest at junctional levels, followed by mobile (C3-6, L2-4) levels.
- 2) **Bone Lesion:** >50% vertebral body collapse, endplate involvement, and lytic lesions indicate increased instability risk.
- 3) **Alignment:** Segmental angulation or translation poses the highest risk, followed by kyphosis/scoliosis.
- 4) **Posterolateral Involvement:** Bilateral > Unilateral involvement for instability.
- 5) **Epidural abscess:** it correlates with mechanical instability, particularly in tuberculous spondylitis, while the role in pyogenic infections requires further study.

Future research should focus on refining scoring systems to improve specificity for infection-related spinal instability. Additionally, standardization of radiographic definitions is necessary to enhance clinical decision-making and surgical planning.

Strength of recommendation: Moderate

Delegate Vote:

Rationale:

Background: Spinal infections, including spondylodiscitis, osteomyelitis, and epidural abscesses, present a significant clinical challenge due to their potential to cause spinal instability or deformity. Early identification of patients at risk of these complications is critical for optimizing treatment strategies, including surgical and non-surgical interventions. This consensus statement synthesizes evidence from seven high-quality studies to provide guidance on the radiographic or imaging predictors of instability or deformity in spinal infections.

Methodology:

A total of 1,818 articles were imported for review. After excluding 259 duplicates, 1,719 articles were subjected to detailed screening. Of these, 1,674 articles were excluded based on predefined criteria. Additionally, 27 articles were categorized as "maybe," requiring further deliberation, and 18 articles had "conflict" among members regarding their inclusion. Following thorough discussion, seven articles were ultimately selected for detailed analysis. For this consensus, radiographic predictors were specifically extracted from the selected studies. Key imaging-based scoring systems, including the Spinal Instability Neoplastic Score (SINS), Spinal Instability Spondylodiscitis Score (SISS) [1], Brighton Spondylodiscitis Score (BSDS) [2,3], and Spinal Infection Treatment Evaluation Score (SITE) [4,5], were analyzed with a focus on their

radiological criteria. A panel of five experts systematically evaluated these radiological factors to develop this consensus.

Key Findings:

1. Radiographic or Imaging Predictors:

- **Location:** Junctional regions (O-C2, C7-T2, T11-L1, L5-S1) > Mobile (C3-6, L2-4) > Semirigid (T3-T10) > Rigid (S2-5) [1,4,6,7]
- **Bone Lesion:** Vertebral body collapse >50% is strongly associated with instability [1,7]; endplate involvement is also a significant predictor [1]; lytic lesions indicate increased risk [7].
- **Alignment Changes:** Angulation/translation presents the highest instability risk [1,7], followed by kyphosis/scoliosis [1,6].
- **Posterolateral Involvement:** Bilateral > Unilateral > None [6].
- **Epidural Abscess Formation:** Correlates with an increased risk of deformity and neurological compromise, particularly in tuberculous spondylitis [1,7]; however, its significance in pyogenic infections requires further study.

2. Clinical Predictors:

- **Neurological Symptoms:** Progressive deficits, such as motor weakness or sensory changes, strongly correlate with instability and the need for surgical stabilization [5,6].
- **Ambulatory status** is predictive of clinical outcomes; however, its relationship with progression of instability remains uncertain. [group opinion]
- **Patient Factors:** Comorbidities such as diabetes, immunosuppression, and advanced age increase the risk of complications and may necessitate more aggressive interventions [2,5]. Probably, End-Stage Renal Failure (ESRF) is associated with greater instability risks compared to diabetes mellitus (DM). [group opinion]

3. Validation and Limitations:

- **Scoring systems:** While SITE and SISS are positioned as the most practical tools to guide surgical planning and define instability, they are not direct factors and require further validation across diverse cohorts [1,5].
- **Definition Ambiguity:** The absence of a universally accepted definition of vertebral instability in infections remains a significant limitation, complicating standardization and direct comparisons of scoring systems [2,7].
- **Modifiers for Clinical Decisions:** The presence of epidural abscess and the progression of deformity should be considered important modifiers in clinical decision-making to refine patient-specific treatment strategies

Conclusion:

The identification of spinal instability in infections relies heavily on radiographic predictors such as vertebral collapse, alignment changes, and posterolateral involvement. By integrating validated scoring systems and imaging-based criteria, clinicians can improve decision-making for surgical stabilization.

This consensus aims to provide a foundation for such efforts and encourages continued research to refine diagnostic and therapeutic strategies [4,5,6].

References:

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