Patterns of spinal metastatic disease and mechanical instability
a retrospective correlation with tumor histology

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Background
- The spinal neoplastic instability score (SINS) is used to assess the degree of spinal instability in patients with spinal metastases
- It relies on a number of factors including 5 radiographic features based on computed tomography (CT) and the character of pain
- We aimed to utilize SINS in describing the incidence and natural history of progression of spinal instability in patients with spinal metastases

Proportions of spinal instability in 285 patients with different histological diagnoses of spinal metastases

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Stable</th>
<th>Potentially Unstable</th>
<th>Unstable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tumors of unknown origin</td>
<td>64.7%</td>
<td>22.6%</td>
<td>12.7%</td>
</tr>
<tr>
<td>Others</td>
<td>28.0%</td>
<td>26.9%</td>
<td>45.1%</td>
</tr>
<tr>
<td>Pancreatic</td>
<td>100%</td>
<td>50.0%</td>
<td>50.0%</td>
</tr>
<tr>
<td>Liver</td>
<td>37.8%</td>
<td>56.4%</td>
<td>5.8%</td>
</tr>
<tr>
<td>Esophagus</td>
<td>90.0%</td>
<td>10.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Renal</td>
<td>99.0%</td>
<td>1.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Thyroid</td>
<td>93.3%</td>
<td>6.7%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Prostate</td>
<td>94.9%</td>
<td>4.8%</td>
<td>0.3%</td>
</tr>
<tr>
<td>Breast</td>
<td>92.1%</td>
<td>7.7%</td>
<td>0.2%</td>
</tr>
<tr>
<td>SCLC</td>
<td>99.6%</td>
<td>0.4%</td>
<td>0.0%</td>
</tr>
<tr>
<td>NSCL</td>
<td>99.6%</td>
<td>0.4%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

Spinal Instability Neoplastic Score (SINS)
- Provide a study of spinal instability associated with different histological types of spinal metastases
- Describe the natural history of spinal metastases in terms of the degree of instability and invasion of the spinal column

Study objectives
- We conducted a retrospective review of 285 patients with spinal metastases
- Disease characteristics and imaging data were obtained
- Patients were scored for two scoring systems
- The spinal instability neoplastic score (SINS)
- Includes several parameters looking at imaging features indicative of instability
- The anatomical classification of spinal metastases suggested by Tomita et al (2001)

Patients and Methods
- We conducted a retrospective review of 285 patients with spinal metastases
- Disease characteristics and imaging data were obtained
- Patients were scored for two scoring systems
- The spinal instability neoplastic score (SINS)
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- The anatomical classification of spinal metastases suggested by Tomita et al (2001)

Conclusions
- Spinal instability occurs invariably in association with spinal metastases
- All cases with thyroid and renal spinal metastases manifest as lytic lesions
- The incidence of severe deformity ranges between 3 and 9%
- Esophageal spinal metastases is associated with the lowest degree of instability including lack of progression when treated with radiation over one year
- One third of solitary spinal metastases progresses into multiple metastases over one year despite radiation

References

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Lytic-type lesions are the most common form of radiological manifestations of spinal metastatic bony invasion (except in prostate cancer where blastic and mixed lesions predominate)

Changes in SINS categories (top) and scores (bottom) over one year in different malignancies

The incidence of deformity in spinal metastases is up to 9%

The degree of spinal column invasion in different spinal metastases

Progression of spinal metastases over an average of 1 year in the radiation group

Ordinal changes in spinal instability over an average of one year after treatment with radiation