Lumbar spinal stenosis: a simple, practical and reliable classification

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MRI-based classification

- Nonspecific:
  "relative", "moderate", "absolute"

- Specific:
  Diameter or area of spinal canal
MRI-based classification


- Classification of LSS into 7 grades (A1-4, B, C, D) on MRI (T2 axial) based on the ratio between nerve roots and CSF
- Inter-rater reliability $\kappa = 0.44$, intra-rater reliability $\kappa = 0.65$
MRI-based classification


- Absence of nerve root sedimentation on MRI (T2 axial) = positive sedimentation sign
- Very high specificity and sensitivity regarding the presence of LSS
- Inter-rater reliability $\kappa = 0.93$, intra-rater reliability $\kappa = 1.0$
## AD-Classification of LSS
(modified from Schizas et al, 2010)

<table>
<thead>
<tr>
<th>Normal</th>
<th>Nerve root sedimentation sign</th>
<th>CSF level (T2 – axial)</th>
<th>Epidural fat</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-</td>
<td>yes: all fibers (except for exiting roots) below the equator</td>
<td>+</td>
</tr>
<tr>
<td>A</td>
<td>+</td>
<td>yes: fibers also above the equator</td>
<td>+</td>
</tr>
<tr>
<td>B</td>
<td>+</td>
<td>no: fibers distributed through all the cross section CSF can still be seen</td>
<td>+</td>
</tr>
<tr>
<td>C</td>
<td>+</td>
<td>no: CSF cannot be seen</td>
<td>+</td>
</tr>
<tr>
<td>D</td>
<td>+</td>
<td>no: CSF cannot be seen</td>
<td>-</td>
</tr>
</tbody>
</table>
Purpose of this study

- To determine inter-rater and intra-rater reliability of the presented AD-classification of LSS
Methods

- Evaluation of 100 axial T2-weighted scans of LSS
- 4 experienced spine surgeons (senior surgeons)
  - 3 residents (junior surgeons)
- Grading: normal, A, B, C or D
- Repeated after 2 weeks under similar conditions, but in a different sequence
- **Statistics:**
  - Inter-rater reliability: Fleiss’ kappa coefficient both overall and for each of the two groups
  - Intra-rater reliability: Cohen’s kappa
Results

Inter-rater reliability

• Overall: $\kappa = 0.70$, standard error (SE) = 0.01
• Senior surgeons: $\kappa = 0.77$, SE = 0.02
• Junior surgeons: $\kappa = 0.74$, SE = 0.03

= good
Results

Intra-rater reliability

- Senior surgeons:
  \( \kappa = 0,73 \ (SE = 0,06) \) bis \( \kappa = 0,89 \ (SE = 0,06) \)

- Junior surgeons:
  \( \kappa = 0,71 \ (SE = 0,06) \) bis \( \kappa = 0,86 \ (SE = 0,06) \)

= good to excellent
Limitations

- No coverage of lateral recess stenosis or neural foraminal stenosis
- Quality of the scans (resolution)
- No external rater
- Correlation of AD-Classification with clinical symptomatology (as yet) unknown
Conclusion

- The AD-classification of LSS presented shows a good inter-rater as well as intra-rater reliability.
- This applies for both experienced and less experienced clinicians.
- Therefore, it can be easily used to communicate and compare the degree of LSS on T2-weighted axial MRI-scans in clinical practice.
- The correlation with clinical symptomatology has to be proven.
Conflict of interest disclosure

None of the authors has any potential conflict of interest.