Correlation of low back pain to a high-intensity zone of the lumbar disc in Indian patients

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ABSTRACT

Purpose. To assess the correlation between low back pain and a high-intensity zone (HIZ) of the lumbar disc in Indian patients.

Methods. 200 patients with low back and/or leg pain underwent magnetic resonance imaging of the lumbosacral spine. The location and severity of pain and disability were assessed using the pain drawing, visual analogue scale, and Oswestry Disability Index, respectively. The inter-observer reliability was assessed using the kappa statistic.

Results. The prevalence of an HIZ was 13% and 17% according to observers A and B, respectively. The inter-observer reliability was fair (κ=0.64, p<0.005). The presence of an HIZ did not correlate with low back pain according to the pain drawing, visual analogue scale, and Oswestry Disability Index. According to the pain drawing data, the sensitivity, specificity, and positive predictive values of an HIZ to low back pain were 11%, 82%, and 62%, respectively.

Conclusion. The presence of an HIZ is not diagnostic of a disrupted and painful disc, and should be interpreted together with other prevailing symptoms and clinical findings.

Key words: low back pain; magnetic resonance imaging; pain measurement

INTRODUCTION

The pathophysiology of low back pain is complicated. The clinical presentation may not correlate with structural abnormalities identified by magnetic resonance imaging (MRI). On lumbar spine MRI, a high-intensity zone (HIZ) within the annulus of a disc (separate from the nucleus pulposus) has a positive predictive value of 86% for a severely disrupted, painful disc. It is claimed that the presence of an HIZ is diagnostic of painful disc disruption, but others found no such correlation. We studied the
prevalence of an HIZ and its correlation with low back pain in a cohort of Indian patients.

MATERIALS AND METHODS

Between February 2003 and September 2003, 200 patients with low back and/or leg pain underwent MRI of the lumbo-sacral spine using a 0.5 T system with a quadrature spine coil and completed a questionnaire involving a pain drawing (Fig. 1), visual analogue scale (VAS), and Oswestry Disability Index (ODI) to assess pain location, pain severity, and disability, respectively.

Two independent observers assessed the presence of an HIZ from L1/2 to L5/S1 on mid-sagittal T2-weighted MRIs (Fig. 2). Observer A was an experienced spinal surgeon and observer B a radiologist. Patients with and without an HIZ were compared using standard non-parametric tests. Correlation between different variables was tested using Pearson’s correlation coefficient (r). A p<0.05 was considered statistically significant. Inter-observer reliability was assessed using the kappa statistic.

RESULTS

25 patients were excluded from analysis because of infection or deformity. Of the remaining 175 patients, 22 (13%) and 30 (17%) were identified with an HIZ by observers A and B, respectively (17 of them by both). One patient was identified as having an HIZ in 2 discs by observer B only but not A. The inter-observer reliability was fair (κ=0.64, p<0.005).

Of 172 patients who completed the pain drawing, 77% located the pain within the lumbo-sacral region and 23% located it outside or indicated a radicular pain only. Patients with no HIZ had higher mean VAS scores but not statistically significant (observer A: 50 vs. 46, p=0.7; observer B: 51 vs. 40, p=0.9, independent sample t test). Patients with and without an HIZ had similar ODI (observer A: 46% vs. 43%, p=0.9; observer B: 44% vs. 44%, p=0.5, independent sample t test). The presence of an HIZ did not correlate with low back pain according to the pain drawing, VAS, and ODI (Table). According to the pain drawing data, the sensitivity, specificity, and positive predictive values of an HIZ for low back pain were 11%, 82%, and 62%, respectively.

<table>
<thead>
<tr>
<th>Clinical parameters</th>
<th>Presence of an HIZ</th>
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<tr>
<td></td>
<td>Observer A</td>
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<tr>
<td>Pain drawing</td>
<td>r=0.1, p=0.7</td>
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<td>Visual analogue scale</td>
<td>r=-0.08, p=0.5</td>
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<td>Oswestry Disability Index</td>
<td>r=-0.04, p=0.1</td>
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Figure 1 An outline drawing of the human body for patients to map the nature and location of their pain. An area of 1 cm high overlying the lumbo-sacral spine is marked; pain within this area is recorded as low back pain.

Figure 2 Mid-sagittal T2-weighted magnetic resonance image showing a high-intensity zone at the L4/5 disc.
DISCUSSION

The prevalence of an HIZ has been reported to be 28 to 59% in patients with low back pain.3,10,20,22 It was much lower in our Indian patients (13% and 17%). The inter-observer reliability of detecting an HIZ in the lumbar disc is fair to good,9 and may be increased by training in interpretation.23 No such training was provided for our observers; only a description and a picture of the appearance of an HIZ were provided. There was no interaction between the observers to reach consensus. An HIZ is considered a reliable indicator of a painful outer annular disruption, as vascularised granulation tissue is formed in the outer region of annulus fibrosus.7

Discography has been used for morphologic assessment of lumbar discs in patients with discogenic pain,3,24,25 but some consider it has limited or no value in modern practice.26,27 There is no clear evidence-based indication for discography in the diagnosis and treatment of low back pain.28

Psychological and chronic pain issues appear to predict pain response in discography. The injection of a disc having an HIZ can itself be painful in asymptomatic patients.27,29 There is no change or spontaneous improvement of symptoms with time, and evolution of an HIZ does not correlate with change in symptoms.30 The presence of an HIZ is not correlated with the duration of symptoms, disability scores, or clinical features.30

The sensitivity, specificity, and positive predictive values of an HIZ in detecting a disrupted and painful disc varies from 27 to 81%, 81 to 95%, and 40 to 88%, respectively.33,49 The low sensitivity indicates that an HIZ does not correlate with low back pain. The high specificity indicates fewer false positive results (an HIZ is rarely seen in patients without low back pain). The presence of an HIZ is not diagnostic of a disrupted and painful disc, and should be interpreted together with other prevailing symptoms and clinical findings.

REFERENCES