Annular tears: the clinical significance of the high-intensity zone on lumbar spine MRI.

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A 'high intensity zone' (HIZ) describes an annular tear with high signal within the annulus on lumbar spine MRI (1). The significance of these annular tears is controversial. Originally described as correlating with the reproduction of a patient's pain on stress discography (1), they have also been found commonly in asymptomatic individuals (2). The aim of this study is to ascertain the clinical significance of the HIZ in patients being investigated for back and leg pain and determine if there are any clinical features which can diagnose the presence of a HIZ.

Method:

Patients referred for lumbar spine MRI for the investigation of back and leg pain were examined. All patients underwent a full clinical examination and oswestry functional disability and psychological questionnaires. MRI was performed on a 1.0 Tesla system with three pulse sequences, sagittal T1 and T2-weighted sequences and an axial at the lower 3 lumbar discs and any additional discs which appeared abnormal on the sagittal sequences

MRI scans were reported from the hard copy, blind to the clinical details. The presence and position of high signal areas anywhere in the circumference of the annulus were recorded. High signal areas located as a localised focus were termed globular, and those found as a linear track within the annulus were termed linear.

Differences between the history and physical examination findings between those patients with and without a HIZ were analysed by t-test and χ^2 test as appropriate. Statistical significance was defined as $p<0.05$.

Results:

MRI scans were performed in 156 patients. In 71 patients (45.5%) a HIZ occurred in one or more levels. Most of the HIZs occurred in the lower lumbar discs with 2 at L1, 3 at L2, 18 at L3, 39 at L4 and 34 at L5. In total they were seen in 96 of the 780 lumbar discs analysed (12.3%). There were 50 with a globular configuration and 46 linear. They were positioned directly posterior in 74 cases (77%), posterolaterally in 21 (22 %) and anteriorly in 1 (1 %).

Of the 156 patients, 73 evidence of neural compression on the MRI scan. So that these features would not be implicated as the cause of the clinical features these patients were excluded from further analysis. This left 83 patients with no evidence of neural compression on MRI and 36 of these (43.4 %) had evidence of a HIZ.

There was no difference between the mean age, duration of symptoms and Oswestry functional disability scores between the two groups, table I. None of the features from the history, table II or clinical examination findings, table III, showed any statistical difference between the two groups.

Conclusions:

A HIZ is a common finding in patients being investigated for low back and leg pain but the presence of a HIZ does not define a group of patients with particular clinical features.

References

1. Aprill C, Bogduk N. Br J Radiol 1992;65:361-9.

2. Stadnik TW, Lee RR, Coen HL, Neirynck EC, Buisseret TS, Osteaux MJ. Radiology 1998;206:49-55.

Table I

Clinical feature	With HIZ mean (SD)		without HIZ mean (SD)		t value	p value
Age	43.1	(12.9)	42.7	(11.8)	0.14	0.89
Duration of symptoms (years)	6.8	(8.4)	5	(6)	1.08	0.28
Oswestry	42.3	(19.3)	48.1	(16.8)	-1.43	0.15
Schober's extension	1.47	(0.94)	1.47	(1.15)	0.018	0.99
Schober's flexion	3.8	(1.56)	3.47	(2)	0.82	0.41

Correlation between the presence of a HIZ and the clinical features (t-test).

Table II

Clinical feature	with HIZ	without HIZ	χ^2	p value
In employment	15	21	0.075	0.78
Above knee leg pain	31	36	1.19	0.28
Below knee leg pain	24	31	0.005	0.95
Pain worse with:				
standing	23	35	1.08	0.3
walking	27	40	1.34	0.25
sitting	23	38	3.01	0.08
bending	22	29	0.003	0.96
Lying	11	21	1.72	0.19
Lifting	25	29	0.54	0.46
coughing	9	16	0.79	0.37
Pain worse at:				
night	16	15	1.37	0.24
morning	9	13	0.07	0.79
daytime-intermittently	4	7	0.25	0.61
daytime continuously	12	19	0.44	0.51
Sudden onset	17	22	0.001	0.97
Condition worsening	20	29	0.32	0.57

Correlation between the presence of a HIZ and the clinical history (χ^2 test).

Table III

Clinical feature	with HIZ	without HIZ	χ^2	p value
Para-spinal muscle spasm	8	15	0.96	0.33
Spinal tenderness	11	16	0.11	0.74
Straight leg raising positive	6	13	1.4	0.24
Abnormal reflexes	4	5	0.005	0.94
Abnormal myotomes	7	7	0.30	0.58
Abnormal dermatomes	5	3	1.32	0.25
Wadell's test positive	5	2	2.45	0.12

Correlation between the presence of a HIZ and the clinical examination (χ^2 test).