ANNULAR TEAR

PROSPECTIVE; SPINE (PHILA PA 1976). 2000 DEC 1;25(23):2987-92.2000

VOLVO AWARD WINNER

The prevalence and significance of a high-intensity zone or annular tear in a group of patients asymptomatic population. They have reported a strong correlation between a high-intensity zone and positive discography. A total of 109 discs in 42 patients were evaluated in the symptomatic group and compared with 143 discs in 54 patients in the asymptomatic group. The prevalence of a high-intensity zone in the patient populations **was 59% in the symptomatic group and 24% in the asymptomatic group.**

IMPORTANCE OF HIZ EUR SPINE J. 2006 MAY;15(5):583-7.

The HIZ was closely associated with a concordant pain response on awake discography. The current study suggests that the HIZ of the lumbar disc on MRI in the patient with low back pain could be considered as a reliable marker of painful outer annular disruption.

SIGNIFICANCE HIZ ZHONGHUA YI XUE ZA ZHI. 2008 SEP 16;88(35):2478-81

Data of 1000 unselected cases, 566 males and 434 females, aged 49.49 (12 - 86), who had MRI ? prevalence of HIZ.

Most located in L4/5 and L5/S1 (74.8%) and the location in left side (153 HIZs) was more common than that in right side.; Shown in superior region (15.4%), middle region (28.8%), as well as inferior region (55.8%); **57.5% were symptomatic**

Discogram scale, LBP could be provoked in 8 of the 9 patients with grade IV and could not be provoked in 6 of the 7 patients with the grade III.

CONCLUSION: Whether HIZ is accompanied with LBP is related to the degree of disc degeneration. When CTD showed the degree of modified Dallas' grade IV and over most of the patients will show LBP.

SIGNIFICANCE HIZ [NEURORADIOLOGY (2011) 53 (SUPPL 1):S161–S165]

Bogduk, the significance of HIZs remains unclear; some studies suggesting that an HIZ is a good indicator of painful internal disc disruption whereas others have suggested differently [Clin Radiol 59:1002–1008].

Many studies have shown a strong association between imaging evidence of an annular tear and the presence of elicited pain during diskography at the same disk. In symptomatic patients, the location of these tears has been shown to correlate with the level of painful disk noted at diskography.

Saifuddin et al recognized that the HIZ is a marker of a painful posterior anular tear in 1998 . Bogduk and Modic noted that an annular fissures might occur in asymptomatic persons and that these fissures may become painful and assume a higher intensity signal when ‘activated’; failure to differentiate between the two types.

Carragee et al investigated the asymptomatic and symptomatic group patients, and suggested that HIZ does not reliably indicate the presence of symptomatic internal disc disruption

Conversely, Ricketson et al were not able to demonstrate a statistically significant correlation between the presence of a high signal intensity zone and pain concordant with the usual symptoms during provocative discography

NEURORADIOLOGY (2011) 53 (SUPPL 1):S161–S165

On Pfirrmann scale, a more profound loss of signal intensity (grade 3 or higher) is almost always associated with the presence of annular tears; at the same time, minimal loss of signal intensity (grade 2) is not infrequent among disks without annular tears;

Bulging discs were believed to result from disc degeneration with an intact anulus, whereas protruded and extruded discs corresponded to annular tears

Disks with annular tears are also likely to show a greater degree of nuclear degeneration and loss of signal intensity on T2-weighted images on follow- up studies .

NEURORADIOLOGY (2011) 53 (SUPPL 1):S161

Annular tears are probably one of the earlier imaging manifestations of the degenerative process affecting the intervertebral disks, and their presence is associated with a more rapid appearance of nuclear degeneration in subsequent imaging studies [AJNR Am J Neuroradiol 30:500–506

AJNR AM J NEURORADIOL. 23: 1105 [2002]

Purpose: Annular tears of lumbar intervertebral disks are found in both symptomatic and asymptomatic persons; therefore, it is difficult to determine whether these findings indicate acute abnormality

High signal intensity on T2-weighted MR images was noted in 26 (96%) of 27 tears initially and persisted in 23 (88%) of 26 (mean interval, 21.9 months; SD, 15.0 months)

IN A CADAVER STUDY, YU (*AJNR AM J NEURORADIOL* 1988;9:367–370

Type I tears, or concentric tears, are characterized by rupture of the transverse fibers connecting adjacent lamellae in the annulus, without disruption of the longitudinal fibers. These tears were not seen on MR images.

Type II tears, or radial tears, are fissures extending from the periphery of the annulus to the nucleus, with disruption of the longitudinal fibers, appearing as hyperintense foci on T2-weighted images.

Type III tears, or transverse tears, are disruptions of Sharpey's fibers at the annular periphery, adjacent to the end plate, also showing hyperintensity at T2-weighted imaging.

ANNULAR TEARS AND EARLY DISK DEGENERATION: AJNR March 2009 30: 500-506

Annular tears and nuclear degeneration often occur concurrently, but their temporal association remains unknown. Annular tears occur in the early stages of disk degeneration and are associated with a faster subsequent nuclear degeneration.[strong association- *Acta Radiol* 1995;**36**:497–504, *AJNR Am J Neuroradiol* 1989;**10**:1077–81]

Definition of AT: The presence of any hyperintense signal intensity within the peripheral annulus was considered to represent an annular tear.

Ten percent of all tears occurred in disks without any loss of signal intensity.

Disc degeneration is more in the annular tear. ?accelerate degeneration [not true in recent publication]

Our results indicate that annular tears are probably one of the earlier imaging manifestations of the degenerative process affecting the intervertebral disks, and their presence is associated with a more rapid appearance of nuclear degeneration in subsequent imaging studies.

ANNULAR TEAR CURRENT THINKING

Tears or fissures can be: separations between annular fibers, separations of annular fibers from their vertebral insertions, breaks through these fibers in any orientation, Involving one or more layers of the annular lamellae

Although the word tear is commonly used to describe the gamut of these lesions, it does not necessarily indicate a traumatic cause [AJNR Am J Neuroradiol 23:1105–1109

Indeed, the degeneration of disc material and radial tear of posterior annulus, rather than being caused by trauma, is the result of spinal instability and serial disc degenerative changes such as a decrease of water content and glycosaminoglycan and imbalance of tissue matrix metalloproteinase levels [10 Asian Spine Journal 1(1):38–4, 2007