

RADIOIMAGISTIC INVESTIGATION IN LUMBAR DISC HERNIA

ALINA VENTER¹, ADRIANA PIRTE², ELENA ROȘCA³

^{1,2,3} University of Oradea, County Clinical Hospital, Oradea

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Abstract: The most frequent cause of lumbar pain is represented by the dislocation of the intervertebral disc. More often than not the disc hernia takes place on a disc that suffered degenerative modifications.

Cuvinte cheie: degenerare discală, hernie de disc lombară, examen IRM

Rezumat: Hernia de disc este cauza cea mai importanta a durerii lombare. Hernia de disc presupune ruperea inelului fibros și deplasarea unei porțiuni a corpului vertebral. Scopul lucrării a fost evidențierea modificărilor radiologice și IRM în herniile de disc lombară.

INTRODUCTION

The most frequent cause of lumbar pain is represented by the dislocation of the intervertebral disc. More often than not the disc hernia takes place on a disc that suffered degenerative modifications. But there are also cases that occur in post traumatic context.(1) The disc hernia implies the breakage of the fibber ring and the movement of a part of the vertebral body. Fragments from the fibber ring and from the cartilaginous plate of the vertebral body always accompany parts of the herniated disc.(2,3) There are several stages of the disc hernias, these vary from small focal protrusions to cases with large sequestered fragments.(1,4)

PURPOSE OF THE STUDY

Emphasis of radiologic modifications and MRI in lumbar disc hernias.

MATERIAL AND METHOD

This work represents a retrospective study done between June 2008 and may 2009 on a group of 82 patients aged between 24 and 69, 48 men (67%)and 34 women (33%). The patients were hospitalized at the Neurosurgery section of the County Clinical Hospital, Oradea, at the Pelican Hospital, Oradea or they came from the ambulatory.

The MRI examination was done at Pelican Medical Centre, Oradea, the acquisition was done with a Siemens apparatus having a 1.5 T power. On the MRI examination I traced signs of the disc degenerations, the bone degenerative modifications, the link with the posterior longitudinal ligament and the radicular-disc conflict.

The lumbar spinal cord radiography was done with a digital radiography apparatus Swis-ray or Siemens, I traced the changes in spindle of the spinal cord, the intervertebral space and signs of disk arthrosis.

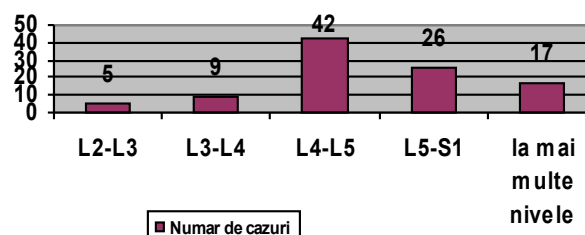
RESULTS AND DISCUSSIONS

The patients were diagnosed with lumbar disc hernia in different stages of evolution through lumbar spinal cord radiography and through MRI examination.

The placements of the lesions were illustrated in the

following picture

Picture no. 1. Placement of lesions in the studied lot

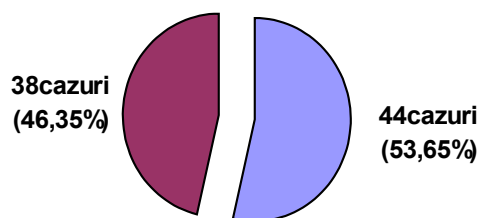


From the analysis of this data results in the most frequent placements were at the L4-L5 and L5-S1 (81.21%)

The lumbar spinal cord radiography does not highlight the disc hernia but suggests its presence through indirect signs these are united in the classical tirade Barr that includes scoliosis, reduced physiological lordosis, narrowing of the intervertebral space.(1,2)

The simultaneous presence of the three elements in our study was found at 44 patients, a sum that represents 53, 65 % of the patients.

Picture no. 2. Triad Barr



■ triada Barr prezenta ■ triada Barr absenta

The disc hernia is accompanied by other degenerative modifications visible at the radiography;(1) these are represented by marginal osteophytosis (visible at 62 patients-75,

¹Autor Corespondent: Alina Venter, Universitatea din Oradea, Facultatea de Medicină și Farmacie, Piata 1Decembrie, Nr. 10, Oradea, Bihor, România, e-mail: alinaventer@gmail.com, tel +40-(269) 0724243934
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60%), osteosclerosis of the vertebral plate (present at 71 patients- 86, 58%), both associated in our study were found at 49 patients- 59, 75%.

Articular instability characterized by small displacements of the vertebral body, mostly visible at “functional” radiography (in hyperflexion or hyperextension) constitutes another suggestive sign for the disc hernia;(5) this was present at 29 patients- 35.36 % of our study.

The elements followed at MRI examination were:

- disc degeneration
- bone degenerative modifications
- the link with the posterior longitudinal ligament
- disc-radicular conflict

Disc degenerative modifications are intercepted in incipient stages that is: the MR signal changes characteristically, the opening of the pulpy nucleus and of the internal part of the fiber ring determines the fading and then the loss of the hyper signal in T2, these structures becoming unable to be separated from the external Sharpey fibers of the fiber ring.(6,7) Subsequently, concentric, radial or transversal cracks of the fiber ring can become visible due to their liquid content as linear areas in hyper signal T2 or after the gadolinium.(6,8) Disc degeneration was also found at 79 patients from our study (96,34%) and was associated with the decrease in disk height at 68 patients(82,92%).

Disc deterioration is associated with the alteration of the cartilaginous plate that separates the fiber ring from the vertebral plateau. Modic described and classified the changes in signal at the level of vertebral bone marrow adjacent to the cartilaginous plateau in three types that reflect the stage of disc degeneration.(9,10)

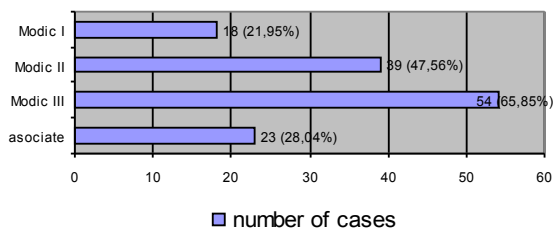
- Type I- early disc degeneration; signal of liquid-inflammatory type: hypersignal T2 aspect, hypo signal T1; histologically, it means the interruption and cracking of the cartilaginous plateaus and the presence of the fibro-vascular tissue at the adjacent bone marrow level and sometimes at the disk space level; it is a reversible stage or it can evolve towards type II.
- Type II- fat type of signal of the vertebral plateaus – aspect in hyper signal T1 and T2; it is due to medullar involution; it is an irreversible stage and it is always followed by the reduction of the of the disc’s height.
- Type III- fiber type of signal- aspect of hypo signal in T1 and T2- it corresponds to the disappearance of the bone marrow in the regions adjacent to the disc degeneration where the processes of reactionary bone reconstruction are established; it corresponds to the stage of compression of the vertebral plateaus visible on the standard radiography.

In our study we have come across the following modifications of the vertebral plateaus:

Picture no. 3. Sagittal section in T2- disc dehydration L4-L5



Picture no. 4. Modic modifications in the studied lot



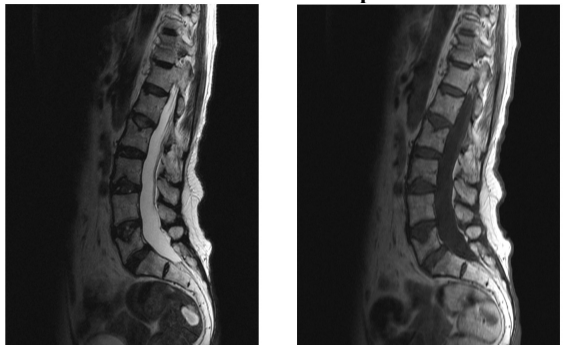
Picture no. 5. Modic modifications tip I



Picture no. 6. Modic modifications tip II



Picture no. 7. Modic modifications tip III



After the report with the **posterior longitudinal ligament**, disc hernias can be:

- Subligamental –when this is intact
- Transligamental – the ligament is interrupted
- Excluded- the ligament is interrupted (4,11)

The stages of the disc hernia are: diffuse disc bulging, protrusion, extrusion, sequestration.(1,3,6)

These can be median when the hernied material compresses the marrow or paramedian when both the marrow and the spinal nerve root uni or bilateral are compressed. In the lateral disc hernia or the foraminal one the root of the spinal nerve is compressed.

When the disc hernia exceeds the posterior longitudinal ligament, we are talking about transligamental disk hernia. Here, the hernied part is contained by the external fibers of the fiber ring and by the posterior longitudinal

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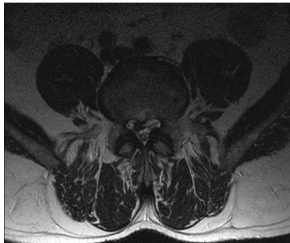
ligament.(1,4,8)

Picture no. 8. Axial section T2 L5-S1 - left foraminal disc hernia



In the case of disc hernia with free parts, a part of the disk penetrates the posterior longitudinal ligament and freely migrates in the spinal channel, either the cranial or the caudal one. Mentioning the location of the sequester is important for the surgical approach.(3,4)

Picture no. 9. Axial section T2- right paramedian discal protrusion



Picture no. 10. Sagittal section T2- transligamentous hernia L4-L5



In our study, the allotment of the injury was the following: median hernia – 28 patients- 34,14%, paramedian hernia 38 patients- 46,34%. Excluded hernia with free fragment (sequester) was found at 16 patients- 19,51%.

The disc radicular conflict was present at 45 patients, which represents 54.87% of the total, that is:

- On the left side – at 27 patients (60%)
- On the right side – at 29 patients (64.44%)
- Bilateral- at 9 patients (20%).

CONCLUSIONS

1. The imagistic exam in lumbar disc hernias points out the localisation of the hernia and the relationship with the dural sac and the spinal nerves.
2. In our study, 82.21 % of the disc hernias happened at L4-L5 level or L5-S1 level; in 20,73 % of the cases there were modifications at different levels.
3. The lumbar spinal cord radiography does not highlight the hernia, but suggests its presence through indirect signs united in the Barr triad; in this study it was present at 53.65% of the patients.

1. Median/paramedian subligamentous disc hernia was the most frequent in our study and more precisely at L4-L5 and L5-S1 level, where the least resistant area of the posterior longitudinal ligament is found.

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