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Two-Dimensional Ultrasonography in the Diagnosis of the Causes of Various Types of Low Back Pain

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Abstract

An accurate definition of the cause and mechanism of low back pain remains an urgent problem in medicine. Pain in the lower back can manifest as lumbago, sciatica, inflammation of the epidural space. Among the causes of lower back pain, the leading place is occupied by degenerative changes in the intervertebral discs with the development of a hernia or protrusion. The size and location of a hernia or protrusion, the presence of an inflammatory process in the epidural space often determine the nature of the clinical symptomatology. MRI is the main method of diagnosing changes in discs and ligamentous apparatus. In some cases, interpretation of MRI images may vary considerably among different specialists. In some patients, its use may be limited. Ultrasonography is an alternative method for diagnosing degenerative-dystrophic changes in the motor segment and the causes of low back pain.

Aim: To evaluate the possibility of ultrasound in the diagnosis of the causes of low back pain of different types - lumbago, radicular pain, radiculopathy.

Material and Methods: The study included 53 patients with lumbar disk hernia and 69 person - only disk protrusion at the age of 38-61 years. All patients underwent X-ray, MRI or CT and ultrasonography. Ultrasonography (USG) was conducted on a Philips HD 11XE device using a convection transducer in the frequency range 2-5 MHz; MRI - General Electric, Signa HDI, 1.5T CT - Toshiba Aquillion 64, which allows you to simultaneously obtain 64 slices 0.5 mm thick, during a full revolution of 0.5 seconds.

Results: In 45 patients, a herniated disc was diagnosed at level only one disk, in 8 cases it was recorded at the level of 2 disks (a total of 61 disks with hernias). In all patient were observed clinical symptoms of low back pain of different type: lumbago, radicular pain, radiculopathy as a only sciatica or sciatica in combination with inflammatory changes in epidural space. 24 patients underwent laminectomy in 31 disks for moderately severe and severe stenosis.

In 31 cases (50.8 ± 6.4%) the hernia of the disc was median or circular, in 21 (34.4 ± 4.5%) - paramedian and in 9 (14.8 ± 4.5%) cases - postlateral. In 29 (40.3 ± 5.8%) discs, the protrusion was median, 35 (48.6 ± 5.9%) - paramedian and 8 (11.1 ± 3.7%) - postlateral. At the level of L2-L3, the hernia of the disc was not recorded.

Median or circular hernia 8 (13,1 ± 4,3%) cases was localized at the level of L3-L4, 11 (18,0 ± 4,9%) - L4-L5 and 12 (19,7 ± 5,1%) - L5-S1; the paramedian hernia was noted in 6 (9,8 ± 3,8%), in 8 (13,1 ± 4,3%) and in 7 (11,5 ± 4,1%) disks; the postlateral - in 2 (3,3 ± 2,3%), in 4 (6,6 ± 3,2%) and in 3 (4,9 ± 2,8%) disks respectively. Among the patients the median or circular type of protrusion in 3 (4,2 ± 2,4%) cases was localized at the level of L2-L3, in 6 (8,3 ± 3,2%) - L3-L4, in 11 (15,3 ± 4,2%) - L4-L5 and in 9 (12,5 ± 3,9%) - L5-S1; the paramedian protrusion - in 4 (5,5 ± 2,7%), in 7 (9,7 ± 3,5%), in 13 (18,1 ± 4,5%) and in 11 (15,3 ± 4,2%) disks; the postlateral - in 1 (1,4 ± 1,4%), in 2 (2,8 ± 1,9%), in 3 (4,1 ± 2,4%) and in 2 (2,8 ± 1,9%) disks respectively.

Lumbago among patients with a median or circular hernia was observed in 14 (45.2 ± 8.9%) cases, paramedian localization of hernia - in 3 (14.3 ± 7.6%) cases and posterolateral hernia - was not observed. In the group of patients with disc protrusion, these parameters were: 24 (82,8 ± 7,0%); 5 (14,3 ± 5,9%) and 2 (2,8 ± 1,9%). Isolated lumbago was significantly more frequent in patients with median and circular protrusions than in hernia ($P < 0,01$).

Radicular pain was observed in 1 (3,2 ± 3,2%), in 2 (9,5 ± 6,4%) and 2 (22,2 ± 13,8%); Sciatica - in 2 (6,4 ± 4,4%), 6 (28,6 ± 10,3%) and in 7 (77,8 ± 13,8%) respectively. Radicular pain with protrusion was recorded only with paramedian localization in 23 (65.7 ± 8.0%) cases, significantly more often than with hernia ($P < 0,01$). In a patients with median and circular protrusion sciatica was observed in 2 (6.9 ± 4.7%), paramedian in 6 (17.1 ± 6.4%) and posterolateral - in 3 (4.1 ± 2.4%) cases respectively; by combination of lumbago and sciatica in 2 (6,9 ± 4,7%), 1 (2,9 ± 2,8%) and in 2 (2,8 ± 1,9%) cases respectively.

Lumbago+Sciatica, epiduritis and Lumbago+Sciatica+Epiduritis among patients with posterolateral hernia were not recorded. Lumbago + Sciatica among patients of the median and paramedian hernia were recorded in 3 (9,7 ± 5,3%) cases, epiduritis - in 4 (12,9 ± 6,0%) and 5 (23,8 ± 9,3%); Lumbago + Sciatica + Epiduritis - in 7 (22.6 ± 7.5%) and 2 (9.5 ± 6.4%) cases respectively. Lumbago+Sciatica among patients of the median and paramedian hernia were recorded in 3 (9,7 ± 5,3%) cases, epiduritis - in 4 (12,9 ± 6,0%) and 5 (23,8 ± 9,3%); Lumbago+Sciatica+Epiduritis - in 7 (22,6 ± 7,5%) and 2 (9,5 ± 6,4%) cases respectively. Sciatica with a posterolateral hernia is recorded more often than with paramedian ($P < 0,01$) and median ($P < 0,001$) hernias. Epiduritis was observed only in 1 (3,4 ± 3,4%) case of circular protrusion. The width of the spinal nerve canal among patients of the median and circular hernias averaged 7,82 ± 0.46 mm, by paramedian localization of hernia - 6,31 ± 0.35 mm, and the posterolateral hernia - 3,42 ± 0.51 mm ($P < 0.001$) respectively. In the group of patients with disc protrusion, these parameters were: 8.74 ± 0.45 mm, 6.91 ± 0.43 mm and 4.14 ± 0.49 mm ($P < 0.01$, $P < 0.001$).

Disturbance of blood flow in the epidural veins was noted in the form of changes in color vascular signals (thinning, expansion, dislocation, absence). Among patients with median and circular hernia, blood flow disorder was registered in 17 (54,8 ± 8,9%) cases, by paramedian hernia - 6 (28,6 ± 10,3%) and posterolateral hernia - in 1 (11,1 ± 10,5%) of case.

Conclusions: The availability, low cost of ultrasonographic examination allows using the method not only as a screening for degenerative changes in lumbar intervertebral discs, but also for differentiating the causes of back pain in combination with clinical symptoms.

The smallest width of the spinal nerve canal is observed with posterolateral hernias and Sciatica is more often observed in these patients. Epiduritis is much more common in patients with circular and paramedian hernia leading to stenosis of the spinal canal. They also often have an impaired epidural blood flow.

Keywords: *Ultrasound Diagnostics; Low Back Pain; Sciatica; Lumbar Intervertebral Disc Hernia*

Introduction

Pain in the lower back can manifest as lumbago, sciatica, inflammation of the epidural space. In most cases, the causes of back pain are several, it is difficult to determine the main one. In such cases, the intensity and nature of the pain, the zone of their distribution, is important. Often the degree of damage and intensity of pain do not match. During remission, most patients with herniated lumbar discs may not feel pain and can lift the weight. Subcooling, uncomfortable forced position of the body, unbalanced lifting of the gravity can cause back pain.

Radiculopathy is one of the variants of pain in the back and it is caused by mechanical compression of the nerve root in the foramin. More often, radiculopathy develops as a result of degenerative disc disease, intervertebral joint, hypertrophy of the ligamentous apparatus, spondylolisthesis or a combination of these factors [1,2]. The appearance of pain syndrome is explained by the increase in ectopic irritability of nerve fibers during their direct damage or the presence of the main factor near it [3].

It should be noted that "radicular pain" or "nerve root pain" is not the same thing. They are more often found in place of, but can be seen separately without the other. For radiculopathy, symptoms such as paresthesia, hypoesthesia, loss of motor function and pain are inherent [4]. Radicular pain is this as one symptom that can arise from one or more spinal nerve roots. Lumbar radiculopathy is a disease in which pain occurs in the lower back and spreads into the leg. This is caused by damage to one of the lower intervertebral discs and the compression of the nerve roots [5].

Since, the hernia of intervertebral discs is the most common cause of development of radiculopathy, its diagnosis is important. To study the role of hernia in the development of radiculopathy, many clinical studies have been devoted. Each of them individually does not meet all the questions posed. These works cover only certain aspects of lumbar radiculopathy [6-13].

Qualitative study of the diagnosis of radiculopathy requires comparison of clinical symptoms and the results of MRI or CT, which can directly visualize the affected discs, the central spinal canal, the canal of the spinal nerves, the intervertebral foramen, the ligamentous apparatus, the presence of an inflammatory process in the epidural space [15,16]. Diagnosis of radiculopathy includes the collection of anamnesis, clinical examination, examination of reflexes, as well as X-rays, MRI studies [17].

Spinal ultrasonography has been used to investigate degenerative disc disease to determine whether back pain is a consequence of fissuring or herniation of the gelatinous discs that separate the vertebrae. Spinal ultrasound has also been used in the assessment of injuries to paraspinal ligaments after spinal fractures. Although ultrasonography has limited ability to reveal bone and tissues surrounding bone, it has been studied as a means to assess the posterior ligament complex that contributes to the maintenance of spinal stability [18-20]. The American Institute of Ultrasound in Medicine (AIUM) Ultrasound Practice Accreditation Council has developed standards for the accreditation of ultrasound practices. These standards serve as a benchmark for ultrasound professionals seeking to meet nationally accepted protocols [21].

Objective

To improve the efficiency of diagnosis the causes of lumbar radiculopathy as a result of degenerative disc disease by determining the ultrasound biomarkers.

Material and Methods

The study included 53 patients with lumbar disk hernia and 69 person - only disk protrusion at the age of 38 - 61 years. All patients underwent X-ray, MRI or CT and ultrasonography.

Ultrasonography (USG) was conducted on a Philips HD 11XE device using a convection transducer in the frequency range 2-5 MHz; MRI - General Electric, Signa HDI, 1.5T; CT - Toshiba Aquillion 64, which allows you to simultaneously obtain 64 slices 0.5 mm thick, during a full revolution of 0.5 seconds.

USG was performed in the sagittal and axial projections along the central line of the abdomen. In the sagittal projection, the position of the lumbar vertebrae, the presence of ante- or retrolistesis was assessed, the height of the discs was estimated. On axial echograms visualized intervertebral discs, central spinal canal, spinal nerve canals, determined epidural blood flow, the thickness of the yellow ligament. The easiest way to visualize the intervertebral disc of L3-L4 was the umbilicus, above - L2-L3 and L1-L2, below L4-L5 and L5-S1. Another guide to determine the position of the disks was the disk L5-S1, which is located in the suprapubic zone above the filled bladder.

The frequency of occurrence of protrusions and hernias, various types of clinical symptoms, the relationship between them and the level of affected discs, the reliability of the differences between the data obtained using the methods of variation statistics for the computer program "Statgraphics" version 3.0 (USA) and "Microsoft Excel" version SO (USA).

Results

In 45 patients, a herniated disc was diagnosed at level only one disk, in 8 cases it was recorded at the level of 2 disks (a total of 61 disks with hernias). In all patient were observed clinical symptoms of low back pain of different type: lumbago, radicular pain, radiculopathy as a only sciatica or sciatica in combination with inflammatory changes in epidural space. 24 patients underwent laminectomy in 31 disks for moderately severe and severe stenosis.

In 31 (50,8 ± 6,4%) disks the hernia was median or circular, in 21 (34,4 ± 4,5%) - paramedian and in 9 (14,8 ± 4,5%) - postlateral types. In 29 (40,3 ± 5,8%) disks the protrusion was median or circular, in 35 (48,6 ± 5,9%) - paramedian and in 8 (11,1 ± 3,7%) - postlateral types. At the patients under examination at the level of L2-L3, hernia of the disk was not recorded. The median or circular hernia in 8 (13,1 ± 4,3%) cases was localized at level of L3-L4, in 11 (18,0 ± 4,9%) - L4-L5 and in 12(19,7 ± 5,1%) - L5-S1; the paramedian hernia -in 6 (9,8 ± 3,8%), in 8 (13,1 ± 4,3%) and in 7 (11,5 ± 4,1%) disks; the postlateral - in 2 (3,3 ± 2,3%), in 4 (6,6 ± 3,2%) and 3 (4,9 ± 2,8%) disks respectively. Among the patients the median or circular type of protrusion in 3 (4,2 ± 2,4%) cases was localized at the level of L2-L3, in 6 (8,3 ± 3,2%) - L3-L4, in 11 (15,3 ± 4,2%) - L4-L5 and in 9 (12,5 ± 3,9%) - L5-S1; the paramedian protrusion - in 4 (5,5 ± 2,7%), in 7 (9,7 ± 3,5%), in 13(18,1 ± 4,5%) and in 11(15,3 ± 4,2%) disks; the postlateral - in 1 (1,4 ± 1,4%), in 2 (2,8 ± 1,9%), in 3 (4,1 ± 2,4%) and in 2 (2,8 ± 1,9%) disks respectively (Table 1).

The level of IVD	Hernia (n = 61 disks (21,4%)			Protrusion (n = 72 disks (20,9%)		
	Median or circular	Paramedian	Postlateral	Median or cirular	Paramedian	Postlateral
	1	2	3	1	2	3
	31 (50,8 ± 6,4%) P1-2 < 0,05 P1-3 < 0,001	21 (34,4 ± 4,5%) P2-3 < 0,01	9 (14,8 ± 4,5%)	29 (40,3 ± 5,8%)	35 (48,6 ± 5,9%)	8 (11,1 ± 3,7%)
L2-L3	-	-	-	3 (4,2 ± 2,4%)	4 (5,5 ± 2,7%)	1 (1,4 ± 1,4%)
L3-L4	8 (13,1 ± 4,3%)	6 (9,8 ± 3,8%)	2 (3,3 ± 2,3%)	6 (8,3 ± 3,2%)	7 (9,7 ± 3,5%)	2 (2,8 ± 1,9%)
L4-L5	11 (18,0 ± 4,9%)	8 (13,1 ± 4,3%)	4 (6,6 ± 3,2%)	11 (15,3 ± 4,2%)	13(18,1 ± 4,5%)	3 (4,1 ± 2,4%)
L5-S1	12(19,7 ± 5,1%) P1-3 <0,05	7 (11,5 ± 4,1%)	3 (4,9 ± 2,8%)	9 (12,5 ± 3,9%)	11(15,3 ± 4,2%)	2 (2,8 ± 1,9%)

Table 1: *The type and level of lumbar discs hernia and protrusion.*

Back pain was divided into the following types: lumbago, radicular, lumbosacral sciatica, lumbago + lumbosacral radiculitis, presence of epiduritis, combination of lumbago + lumbosacral radiculitis + epiduritis (Table 2). Lumbago among patients with a median or circular hernia was observed in 14 (45.2 ± 8.9%) cases, with paramedic hernia - in 3 (14.3 ± 7.6%) cases and posterolateral hernia - was not observed. In the group of patients with disc protrusion, these parameters were: 24 (82,8 ± 7,0%); 5 (14,3 ± 5,9%) and 2 (2,8 ± 1,9%). Isolated lumbago was significantly more frequent in patients with median and circular protrusions than in hernia (P < 0,01).

Clinical symptoms	Median or circular	Paramedian	Postlateral	Median or cirular	Paramedian	Postlateral
	1	2	3	1	2	3
	31	21	9	29	35	8
Lumbago	14 (45,2 ± 8,9%)	3 (14,3 ± 7,6%)	-	24 (82,8 ± 7,0%) P1-1 < 0,01	5 (14,3 ± 5,9%)	2 (2,8 ± 1,9%)
Radicular	1 (3,2 ± 3,2%)	2 (9,5 ± 6,4%)	2(22,2 ± 13,8%)		23 (65,7 ± 8,0%) P2-2 < 0,001	-
Sciatica	2 (6,4 ± 4,4%)	6 (28,6 ± 10,3%) P2-1 < 0,05	7 (77,8 ± 13,8%) P3-2 < 0,01 P3-1 < 0,001	2 (6,9 ± 4,7%)	6 (17,1 ± 6,4%)	3 (4,1 ± 2,4%)
L+S	3 (9,7 ± 5,3%)	3 (14,3 ± 7,6%)	-	2 (6,9 ± 4,7%)	1 (2,9 ± 2,8%)	2 (2,8 ± 1,9%)
Epiduritis	4 (12,9 ± 6,0%)	5 (23,8 ± 9,3%)	-	1 (3,4 ± 3,4%)	-	
L+S+E	7 (22,6 ± 7,5%)	2 (9,5 ± 6,4%)	-	-		
W of SNC	7,82 ± 0,46mm	6,31 ± 0,35mm	3,42 ± 0,51 mm P3-1 < 0,001	8,74 ± 0,45 mm	6,91 ± 0,43 mm	4,14 ± 0,49 mm P 3-2 < 0,01 P3-1 < 0,001
BFDEV	17(54,8 ± 8,9%)	6(28,6 ± 10,3%)	1 (11,1 ± 10,5%)	2 (6,9 ± 4,7%)	4 (11,4 ± 5,4%)	-

Table 2: *Comparison of clinical symptoms and preferential localization of hernia and protrusion of intervertebral discs among the examined patients*

BFDEV: Blood Flow Disturbance in Epidural Vein; W of SNC - the width of spinal nerve canal

Radicular pain was observed in 1 (3,2 ± 3,2%), in 2 (9,5 ± 6,4%) and 2 (22,2 ± 13,8%); Sciatica - in 2 (6,4 ± 4,4%), 6 (28,6 ± 10,3%) and in 7 (77,8 ± 13,8%) respectively. Radicular pain with protrusion was recorded only with paramedian localization in 23 (65.7 ± 8.0%) cases, significantly more often than with hernia (P <0.01). With median and circular protrusion sciatica was observed in 2 (6.9 ± 4.7%), paramedian in 6 (17.1 ± 6.4%) and posterolateral - in 3 (4.1 ± 2.4%) cases respectively; the combination of lumbago and sciatica in 2 (6,9 ± 4,7%), 1 (2,9 ± 2,8%) and in 2 (2,8 ± 1,9%) cases respectively.

Lumbago+Sciatica, epiduritis and Lumbago+Sciatica+Epiduritis among patients with posterolateral hernia were not recorded. Lumbago + Sciatica among patients of the median and paramedian hernia were recorded in 3 (9,7 ± 5,3%) cases, epiduritis - in 4 (12,9 ± 6,0%) and 5 (23,8 ± 9,3%); Lumbago + Sciatica + Epiduritis - in 7 (22.6 ± 7.5%) and 2 (9.5 ± 6.4%) cases respectively. Lumbago+Sciatica among patients of the median and paramedian hernia were recorded in 3 (9,7 ± 5,3%) cases, epiduritis - in 4 (12,9 ± 6,0%) and 5 (23,8 ± 9,3%); Lumbago+Sciatica+Epiduritis - in 7 (22,6 ± 7,5%) and 2 (9,5 ± 6,4%) cases respectively. Sciatica with a posterolateral hernia is recorded more often than with paramedian (P < 0,01) and median (P < 0,001) hernias, and with a paramedian hernia more often than a median hernia (P < 0.05). Epiduritis was observed only in 1 (3,4 ± 3,4%) case of circular protrusion.

The width of the spinal nerve canal among patients of the median and circular hernias averaged 7,82 ± 0.46 mm, the paramedian hernia - 6,31 ± 0.35 mm, and the posterolateral hernia - 3,42 ± 0.51 mm (P < 0.001) respectively. In the group of patients with disc protrusion, these parameters were: 8.74 ± 0.45 mm, 6.91 ± 0.43mm and 4.14 ± 0.49mm (P < 0.01, P < 0.001).

Disturbance of blood flow in the epidural veins was noted in the form of changes in color vascular signals (thinning, expansion, dislocation, absence). Among patients with median and circular hernia, blood flow disorder was registered in 17 (54,8 ± 8,9%) cases, paramedian hernia - 6 (28,6 ± 10,3%) and posterolateral hernia - in 1 (11,1 ± 10,5%) of case (Figure 1-5).

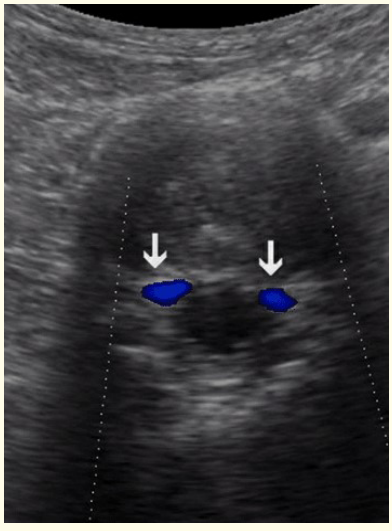

Figure 1: *Normal lumbar disc with visualization of the epidural veins (arrows).*

Figure 2: *Echogram of the intervertebral disc L4-L5 in a patient with lumbar pain and sciatica with spreading to the right leg. A large paramedian hernia with stenosis of the radicular canal (arrow) is defined.*

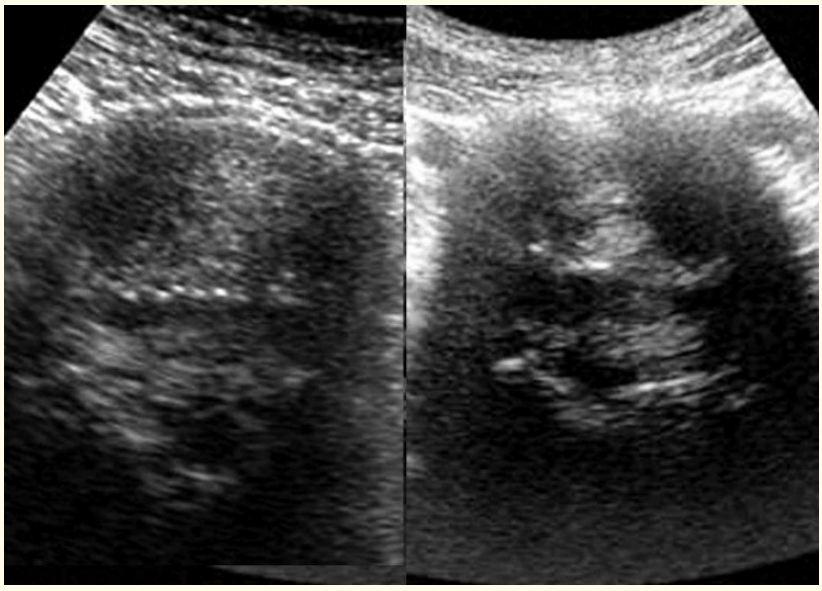

Figure 3: *The large circular hernia of L4-L5 and L5-S1 disks with severe spinal stenosis, epiduritis in a patient with lumbago, chronic sciatica.*

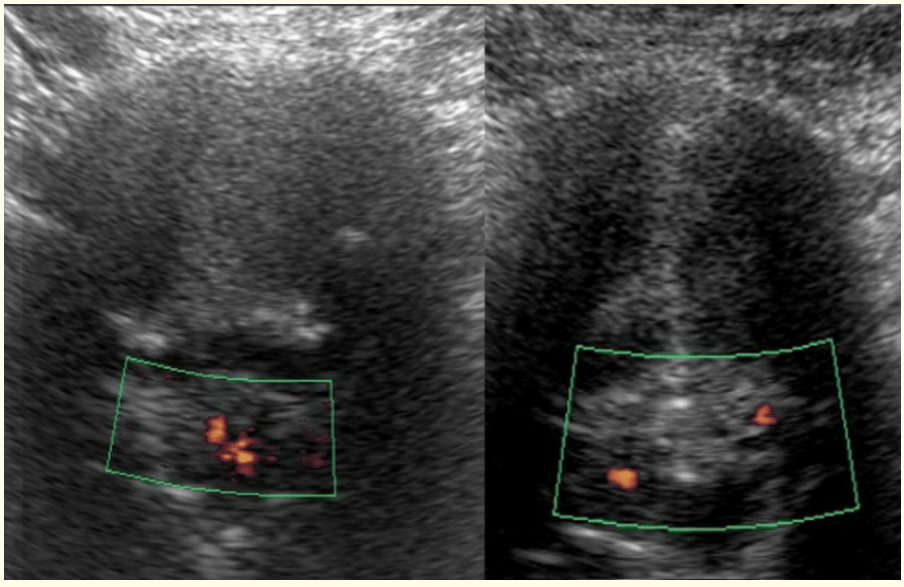

Figure 4: *The large sequestering circular hernia with severe spinal stenosis at the level of L4-L5 and L5-S1 in a patient with lumbago+sciatica+epiduritis. Dislocation of epidural vessels are seen.*

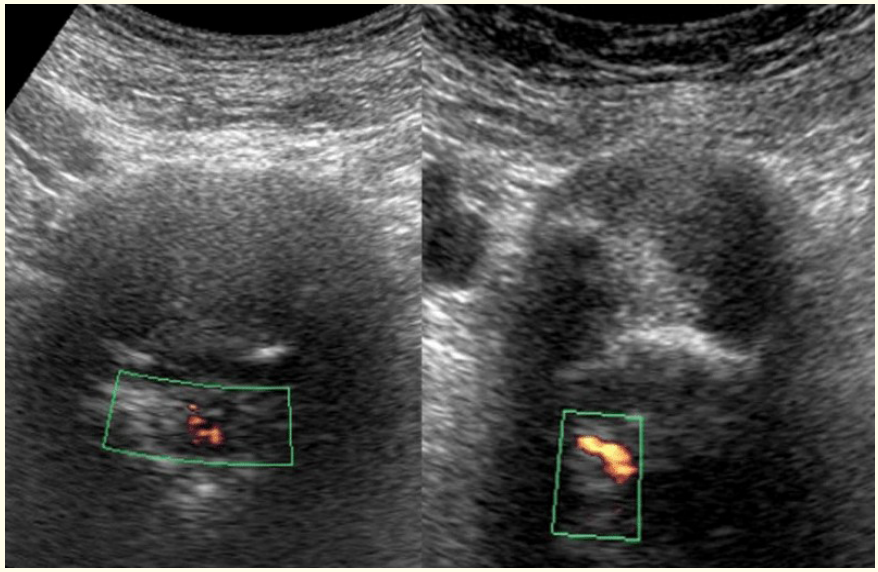

Figure 5: *A large sequestering round hernia with severe spinal stenosis at the level of L4-L5 and the right side of the paramedian hernia at level L5-S1 in a patient with lumbago, with right-sided sciatica. There is a dislocation of epidural vessels.*

The quality of ultrasonographic imaging depended on the distance between the transducer surface and the posterior surface of the central spinal canal. Reducing the distance to the object was achieved by gently pressing the transducer to a relaxed abdomen at the patient's permission. A distance of less than 7 cm provided a quality image, from 7 cm to 10 cm - good, and more than 10 cm - in a few causes not a satisfactory. With an increase in the distance from the sensor to the spine, the unsatisfactory image of the discs was recorded statistically more reliably (P < 0,05) (Table 3).

Quality image	**The distance from the transducer to the posterior surface of the spinal canal (n=122)**		
	< 7 cm	7 - 10 cm	> 10 cm
Excellent	56 45,9 ± 4,5	2 1,6 ± 1,1	-
Good	21 17,2 ± 3,4	31 25,4 ± 3,9	-
Not a satisfactory image	-	2 1,6 ± 1,1	10 8,2 ± 2,5 P < 0,05

Table 3: *Comparison with the distance from the transducer to posterior wall of the spinal canal and of the image quality of the lumbar discs.*

In 3 patients, because of the large abdomen, the image of the discs from the direct projection was not determined at all, but they were absence in the number of operated ones. A small turn of the patient aside allowed to reduce the distance to the object from the anterolateral access, however, the image of the discs is oblique and it is easy to confuse the paramedian and posterolateral protrusion of the disc. In

2 patients, due to the phobia of the enclosed space and in 3 cases due to the breakdown of the MRI, CT was performed (5 studies in total). Since, CT was conducted only to 5 patients, we compared the results of ultrasonography with MRI (Table 4).

The quality of image	USG (n=122)	MRI (n = 117)
Excellent	58 (47,5 ± 4,5%)	70 (59,8 ± 4,5%) P < 0,05
good	52 (42,6 ± 4,4%)	45 (38,5 ± 4,5%)
Not a satisfactory image	12 (9,8 ± 2,7%) P < 0,05	2 (1,7 ± 1,2%)

Table 4: *Comparison of the image quality of the discs by USG and MRI.*

As can be seen from table 4, an excellent image of MRI discs was recorded more often than with ultrasound examination (P < 0.05). In 12 cases, the ultrasonographic image was not satisfactory, and with MRI only in 2 cases, the difference between them was statistically significant (P < 0.05).

Discussion

Approximately 80% of the population is plagued at one time or another by lower back pain. In most patients, sciatica is temporary and treatment is performed non-surgically by using anti-inflammatory drugs, physiotherapy procedures, exercises. Patients with recurrent sciatica due to stenosis of the spinal canal require surgical accommodation. In those cases when a patient with a large hernia has paralysis or acute incontinence, then urgent surgery is necessary (Alta Skelton, Curtis A. Dickman, 2017).

Degenerative changes in the discs, especially the formation of a hernia, are the most frequent causes of spinal pain. MRI is the preferred method of diagnosing and evaluating of herniated and protruted discs, compression of nerve root, inflammatory processing in epidural space. The results of our studies showed that the postlateral hernias and protrusions cause a maximal decrease in the width of the spinal nerve canal and compression of nerve root. In patient with circular and paramedian hernias often combined the clinical symptoms of lumbago, sciatica and epiduritis.

Unconditionally MRI is the most common, and the image is more "understandable" for a significant majority of doctors (neurologists, orthopedists). The quality of the ultrasound image directly depends on the distance between the surface of the transducer and the back contour of the spinal canal to see all the elements of the vertebral motor segment. If the patient combines abdominal muscle mass with obesity, then it is difficult to reduce the distance to the object by pressure on the abdomen. Even for MRI, obese patients are difficult and image quality also deteriorates. For ultrasound, the implication is not only the patient's obesity, but the elasticity of the abdomen. For example, even in obese women it is easier to obtain images of the disc than those of the same men, since in most cases the first abdomen is softer.

Currently, clinics have ultrasound devices with greater capabilities than the Philips HD 11XE. The use of Doppler modes will provide additional information about the state of epidural blood flow. Dopplerography of the epidural vein flow in a patient with sequestering hernias often recorded a circulatory disturbance that does not provide an MRI.

Comments

In connection with the wide use of ultrasonography in various fields of clinical medicine, in particular in the diagnosis of degenerative changes in the intervertebral discs of the lumbar region, the question arises for the clinician: what method of research should be chosen - MRI or USG? USG is much less expensive, but can it answer all the questions of a clinician?

Ultrasound examination has some limitations, among them the main are obesity and bloating of the intestine. Given the degree of obesity, in patients without obesity and with a body mass index of up to 40 kg/m^2, an excellent, good or satisfactory ultrasound image quality can be obtained, more than 40 kg/m^2 - better to be directed to MRI. If we take into account the circumference of the waist, then in patients with a value of this index more than 120 cm, an unsatisfactory picture is also expected.

Patients with a tendency to flatulence should be prepared before ultrasonography and the study should be performed on an empty stomach.

Conclusions

The availability, low cost of ultrasonographic examination allows using the method not only as a screening for degenerative changes in lumbar intervertebral discs, but also for differentiating the causes of back pain in combination with clinical symptoms.

The smallest width of the spinal nerve canal is observed with posterolateral hernias and Sciatica is more often observed in these patients. Epiduritis is much more common in patients with circular and paramedian hernia leading to stenosis of the spinal canal. They also often have an impaired epidural blood flow.

Conflict of Interest

The authors declared no potential conflict of interest with respect to the research, authorship, and/or publication of this article.

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