

SPONTANEOUS RESOLUTION OF SCIATICA IN LUMBAR DISC EXTRUSIONS

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Abstract

Sciatica is a common disturbance that presents itself with an excruciating pain in the leg accompanied with paresthesia or dysesthesia along the leg which can disable patients with their everyday activities. The aim of this study is to present cases of sciatica with spontaneous resolution.

We present 9 illustrative cases of patients with sciatica caused by extrusion of lumbar disc who recovered spontaneously within a year of follow-up. The patients were examined and treated in the Specialized Hospital for Orthopedic Surgery and Traumatology "St. Erazmo" in Ohrid, R. Macedonia in the period of 2018 to 2020. Eight of nine patients were suggested to be treated by surgery because of the symptoms of sciatica and the magnetic resonance findings of the lumbar spine, but they refused.

The cases present patients with sciatica caused by lumbar disc extrusion which resolved spontaneously without surgery. Patients should be indicated for magnetic resonance imaging for precise indications, not only for acute onset of leg pain caused by sciatica. Conservative treatment should be considered as an option for treatment of sciatica.

Key words: spontaneous resolution, sciatica, extrusion.

Introduction

Sciatica is a very common disturbance in health in all humans which presents itself with an excruciating pain in the leg accompanied with paresthesia or dysesthesia along the leg which can prevent the patients in doing everyday activities [1].

Sciatica can be a result of lumbar intervertebral disc bulging, protrusion, extrusion, fragmentation, segmentation. Even the piriformis syndrome is included in the etiology, but there is discussion about the possibilities of even existing as pathology.

The outcome of the sciatica is generally benevolent, or it can resolve itself in 1-2 weeks up to 4-6 weeks without repercussion to the neurological function of the sciatic nerve in general.

Spontaneous regression which can be seen in natural course of the lumbar disc disease, is first identified by Key in 1945, later on, this phenomenon has taken place frequently in literature [2].

Although the first reported surgery for lumbar disc herniation was performed more than 60 years ago, the exact treatment method still remains doubtful [3]. Some neurological symptoms due to intervertebral disc herniation may frequently improve without surgical intervention [4-12] and over a period of time, the size of the disc can be reduced by itself or via nonoperative methods.

The aim of this study is to present cases of sciatica with spontaneous resolution.

Material and methods

We present 9 illustrative cases of patients with sciatica caused by extrusion of the lumbar disc who recovered spontaneously within a year of follow-up.

The patients were examined and treated in the Specialized Hospital for Orthopedic Surgery and Traumatology "St. Erazmo" in Ohrid, R. Macedonia in the period of 2018 to 2020. Eight of nine patients were suggested to be treated by surgery because of the symptoms of sciatica and the MRI findings of the lumbar spine, but they refused. All patients were observed and a significant spontaneous recovery was registered with a control MRI of the lumbar spine. The clinical exam included straight leg test, testing sensibility of the legs, presence/absence of reflexes, ability to walk

on toes and heels, sphincter continence and pain assessment was done by Visual Analog Scale (VAS). The radiological examination was done by MRI. The patients with symptoms and signs of lumbosacral radiculopathy who refused surgery and the patients relieved of symptoms were followed-up by a control MRI and a control clinical exam more than 2 months.

The first and the control exams were done in the Specialized Hospital for Orthopedic Surgery and Traumatology “St. Erazmo” in Ohrid, R. Macedonia. Disc extrusion is defined on magnetic resonance imaging (MRI) when, in at least one plane, any distance between the edges of the disc material beyond the disc space is greater than the distance between the edges of the base of the disc material beyond the disc space, or when no continuity exists between the disc material beyond the disc space and that within the disc space.

The latter form of extrusion is best further specified or subclassified as sequestration, if the displaced disc material has lost completely any continuity with the parent disc. The term migration may be used to signify displacement of the disc material away from the site of extrusion [1].

Case 1

A 52-year old male patient with pain in the lumbar spine radiating in the right leg lasting for 2 months, with difficulties in walking and using a walking stick after heavy work, was referred to a neurosurgeon.

On admission, the straight leg test was positive on the right leg at 45 degrees, the patient was without sensory difficulties, no sensory disturbances, no sphincter incontinence, normal leg reflexes, no pathological reflexes also he was able to walk on heels and toes, Visual Analog Scale (VAS) = 8/10.

On the MRI of the lumbar spine there was a big extrusion of the L4/L5 intervertebral disc with medial propagation with critical secondary spinal stenosis. An operative intervention for extirpation of the extrusion was suggested, which the patient refused. The patient was informed of the possible neurologic deterioration.

Further medical observation was suggested and after 15 months of follow-up the patient was referred to neurosurgeon with a control MRI of the lumbar spine with a complete resolution of the extrusion (Fig. 1), resolution of the subjective problems in the right leg and VAS = 1/10. Meanwhile, he underwent physical therapy and vitamin therapy.

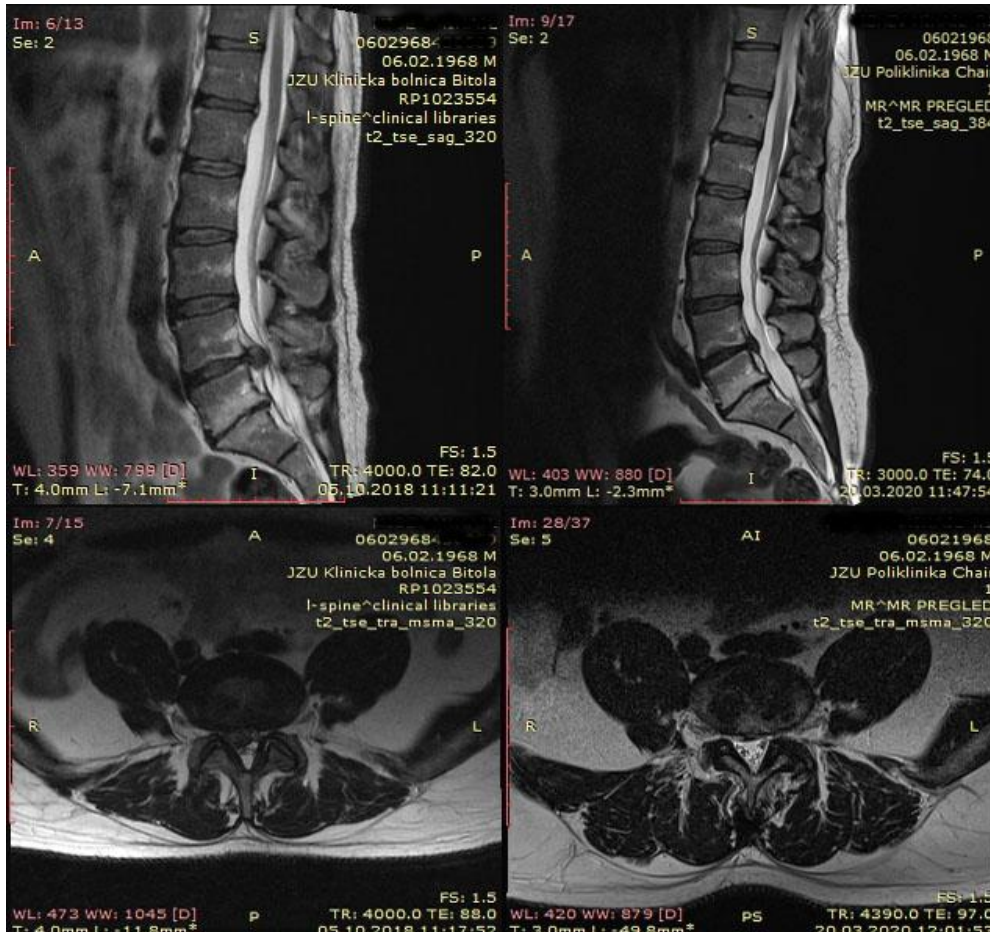


Figure 1. *Left.* Sagittal T2 weighted image of the lumbar spine and axial T2 weighted image at L4/L5 level of 52 years old man show disc extrusion at L4/L5; *Right.* Sagittal T2 weighted image of the lumbar spine and axial T2 weighted image at L4/L5 level of 52 years old man show spontaneous regression of the disc extrusion at L4/L5.

Case 2

A 35-years old female patient with pain in the lumbar spine radiating in the right leg lasting for 2 weeks and previous chronic problems in the spine, with 2 pregnancies, with difficulties in walking which arose following heavy work, was referred to a neurosurgeon. On admission, the straight leg test was positive on the right leg at 30 degrees, the patient had sensory disturbances along dermatome L5 on the right, no sphincter incontinence, normal leg reflexes, no pathological reflexes, as well as she was able to walk on heels and toes, VAS = 10/10. On the MRI of the lumbar spine performed after 2 months, there was an extrusion of the L5/S1 intervertebral disc with dorsomediolateral propagation to the right. An operative intervention for extirpation of the extrusion was suggested but the patient refused. Further medical observation was suggested and after 5 months of following-up, the patient was referred to a neurosurgeon with a control MRI of the lumbar spine (Fig. 2). There was a complete resolution of the extrusion, the subjective problems in the right leg were no longer present, and VAS = 0/10. Meanwhile, she underwent physical therapy and vitamin therapy.

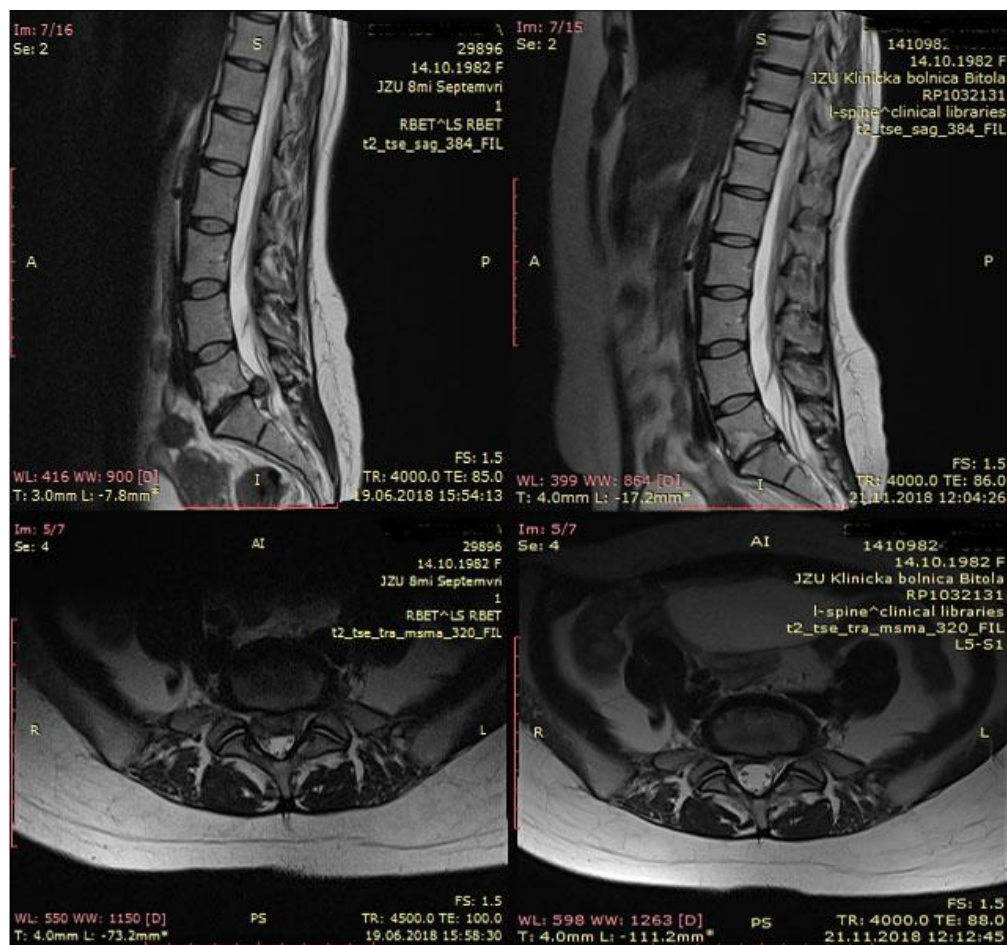


Figure 2. *Left.* Sagittal T2 weighted image of the lumbar spine and axial T2 weighted image at L5/S1 level of 35 years old woman show disc extrusion at L5/S1; *Right.* Sagittal T2 weighted image of the lumbar spine and axial T2 weighted image at L5/S1 level of 35 years old woman show spontaneous regression of the disc extrusion at L5/S1.

Case 3

A 42-years old female patient with pain in the lumbar spine radiating in the right leg and paresthesia in the toes of the right foot lasting 2.5 months, with 2 pregnancies, with difficulties in walking which arose following heavy work, was referred to a neurosurgeon. She had previous physical therapy with mild relief of the symptoms. On admission, the straight leg test was positive on the right leg at 45 degrees, she had sensory disturbances along dermatome S1 on the right, no sphincter incontinence, normal leg reflexes, no pathological reflexes, and the patient was able to walk on heels and toes, VAS = 7/10. On the MRI of the lumbar spine performed after 2 months, there was an extrusion of the L5/S1 intervertebral disc with segmentation migrating caudally dorsolaterally behind the S1 vertebra to the right. An operative intervention for extirpation of the extrusion was suggested but the patient refused. Further medical observation was suggested and after 3 months of follow-up the patient was referred to a neurosurgeon with a control MRI of the lumbar spine with significant decrease of the extrusion with enough space for the right spinal root into the foramen of the L5/S1 right space (Fig. 3).

The patient had improvement of the subjective problems in the right leg and VAS = 2/10. Meanwhile, she underwent physical therapy and vitamin therapy.

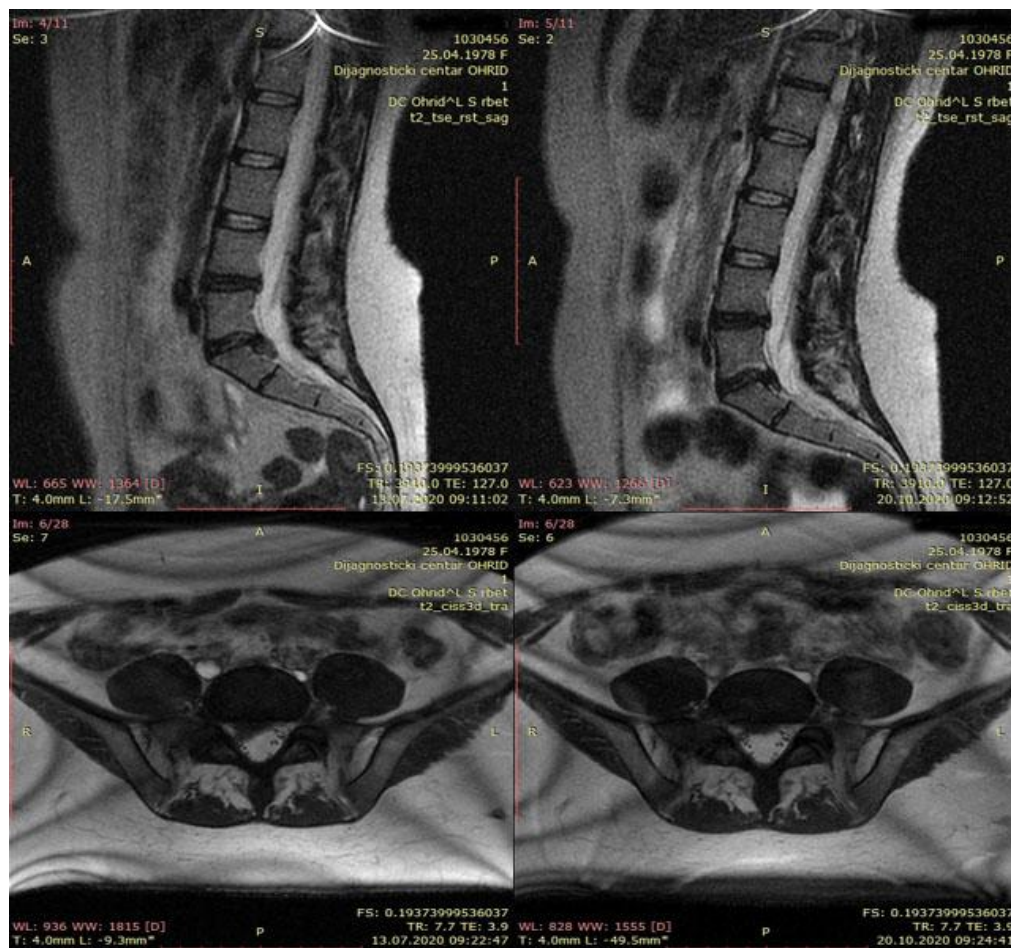


Figure 3. *Left.* Sagittal T2 weighted image of the lumbar spine and axial T2 weighted image at L5/S1 level of 42 years old woman show disc extrusion at L5/S1 with sequestration and downward migration. *Right.* Sagittal T2 weighted image of the lumbar spine and axial T2 weighted image at L5/S1 level of 42 years old woman show spontaneous regression of the disc sequestration.

Case 4

A 54-year old male patient with pain in the lumbar spine radiating in the left leg lasting for 9 months, with difficulties in walking, with loosening of the left foot, was referred to a neurosurgeon. On admission, the straight leg test was negative on both legs, the patient had sensory disturbances along dermatomes L5 and S1 to the left, no sphincter incontinence, decreased reflex on the left Achilles tendon on the left foot, no pathological reflexes, decreased dorsal flexion on the left foot, VAS = 6/10. On the MRI of the lumbar spine there was a big extrusion of the L5/S1 intervertebral disc with distal segmentation of the extrusion behind the S1 vertebra to the left. An operative intervention for extirpation of the extrusion was suggested, explaining the possible motor deficit on the left foot, but the patient refused. Further medical observation was suggested and after 6 months of follow-up the patient was referred to a neurosurgeon with a control MRI of the lumbar spine with complete resolution of the extrusion (Fig. 4), resolution of the subjective problems in the right leg and VAS = 0/10. Meanwhile, he underwent physical and vitamin therapy with persistent motor deficit on the left foot in dorsal flexion, using an orthosis in order to maintain the left foot in stable position.

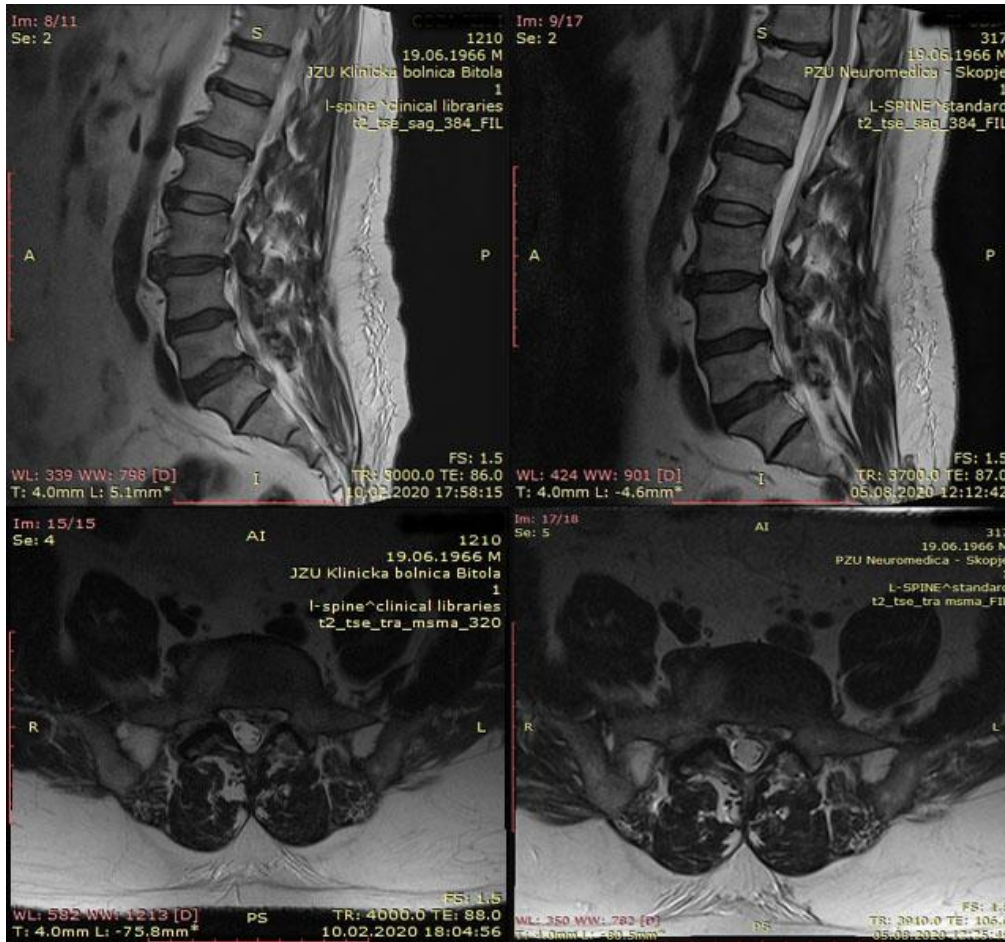


Figure 4. *Left.* Sagittal T2 weighted image of the lumbar spine and axial T2 weighted image at L5/S1 level of 54 years old man show disc extrusion and sequestration at L5/S1; *Right.* Sagittal T2 weighted image of the lumbar spine and axial T2 weighted image at L5/S1 level of 54 years old man show spontaneous regression sequestration.

Case 5

A 36-years old female patient with pain in the lumbar spine radiating in the right leg to the fifth toe of the right foot, lasting for 8 months, which appeared spontaneously, was referred to a neurosurgeon. On admission, the straight leg test was positive on the right leg at 45 degrees, the patient had sensory disturbances along dermatome L5 and S1 on the right, no sphincter incontinence, normal leg reflexes, no pathological reflexes, and she was able to walk on heels and toes, VAS = 9/10. On the MRI of the lumbar spine there was an extrusion of the L5/S1 intervertebral disc with dorsolateral to the right. An operative intervention for extirpation of the extrusion was suggested, but the patient refused. After 1 month of observation she had significant improvement of the subjective symptoms. Further medical observation was suggested and after 10 months of follow-up the patient was referred to a neurosurgeon with a control MRI of the lumbar spine with complete resolution of the extrusion (Fig. 5), resolution of the subjective problems in the right leg and VAS = 1/10. Meanwhile, she underwent physical therapy and vitamin therapy.

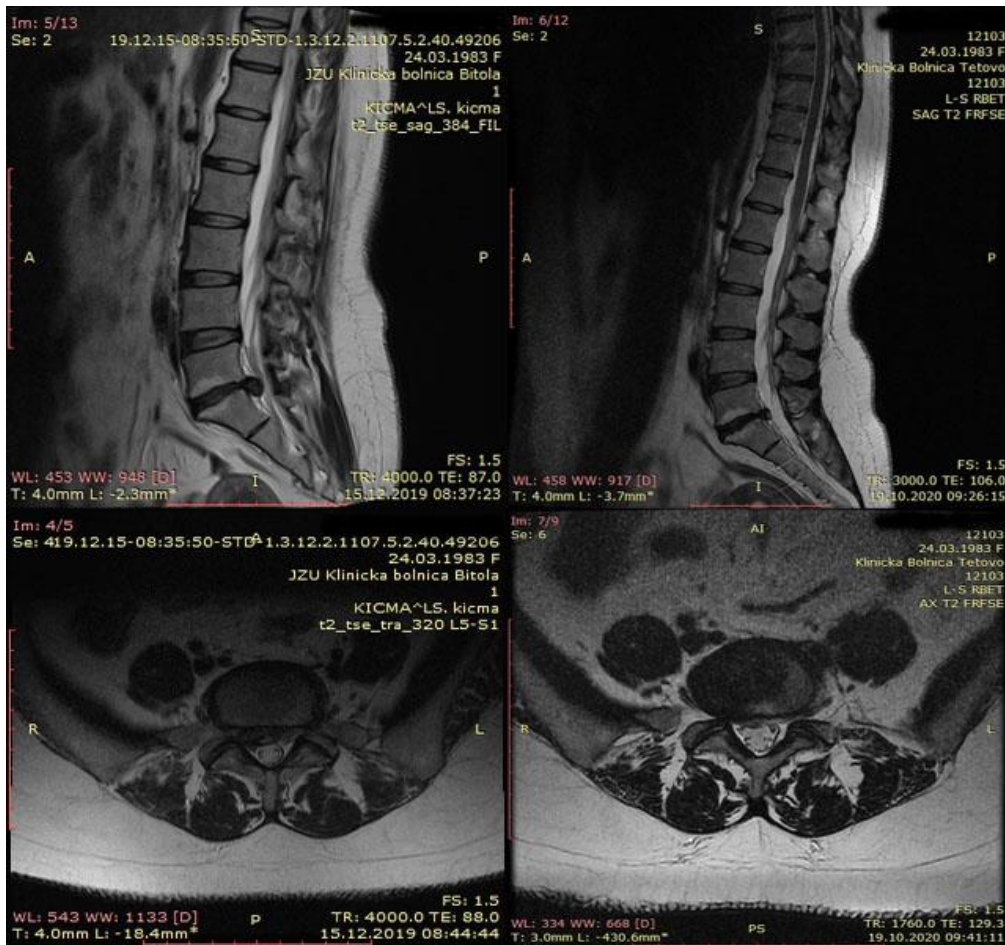


Figure 5. *Left.* Sagittal T2 weighted image of the lumbar spine and axial T2 weighted image at L5/S1 level of 36 years old woman show disc extrusion at L5/S1; *Right.* Sagittal T2 weighted image of the lumbar spine and axial T2 weighted image at L5/S1 level of 36 years old woman show spontaneous regression of the disc extrusion.

Case 6

A 37-year old male patient, banker, with pain in the lumbar spine radiating in the left leg lasting for 3 weeks, treated by physical medicine specialist with significant relief of the symptoms, was referred to a neurosurgeon after 3 months of the onset of the symptoms, with magnetic resonance imaging of the lumbar spine. On admission, the straight leg test was negative on both legs, the patient did not have sensory disturbances on both legs, no sphincter incontinence, normal reflexes on both legs and no pathological reflexes, VAS = 1/10. On the MRI of the lumbar spine there was a big extrusion of the L4/L5 intervertebral disc with dorsolateral propagation to left. Because of the absence of subjective and objective symptoms and signs, there was no indication for surgical intervention. Further medical observation was suggested and after 3 months of follow-up the patient was referred to a neurosurgeon with a control MRI of the lumbar spine with a complete resolution of the extrusion (Fig. 6), resolution of the subjective problems in the left leg and VAS = 0/10. Meanwhile, he did not undergo physical therapy and vitamin therapy.

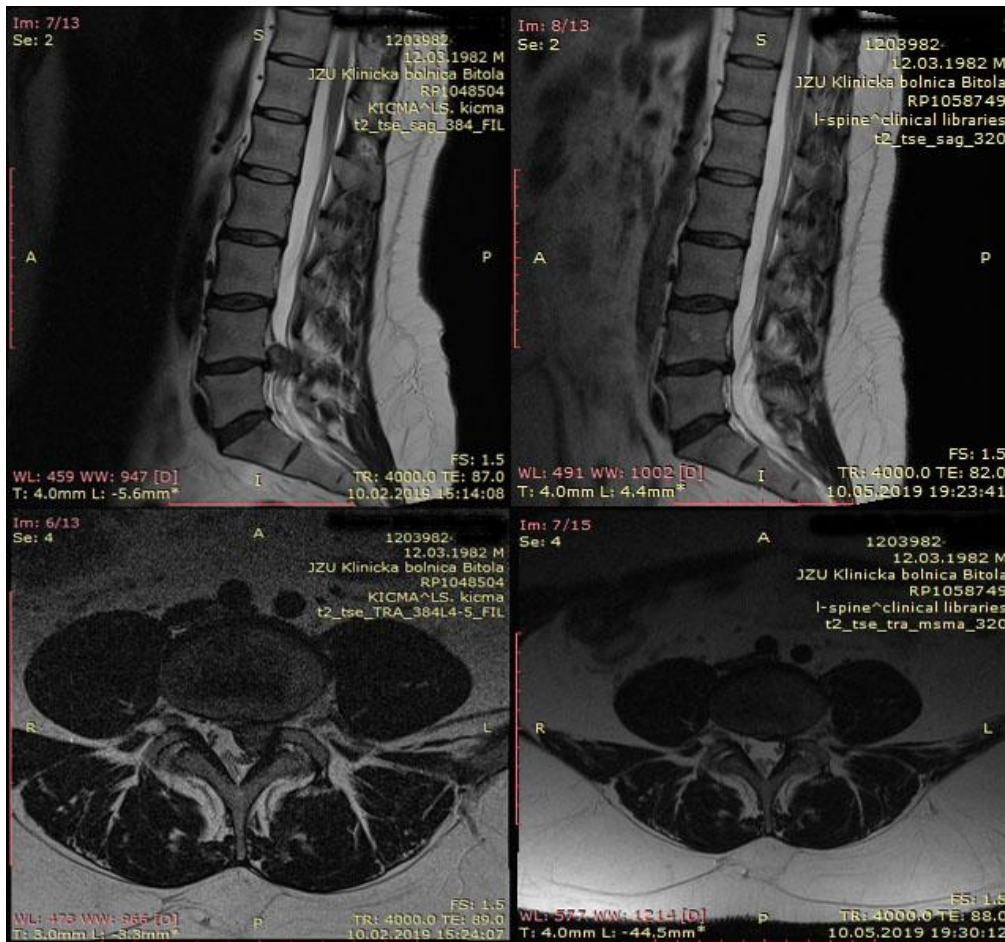


Figure 6. *Left.* Sagittal T2 weighted image of the lumbar spine and axial T2 weighted image at L4/L5 level of 37 years old man show disc extrusion with upward migration of the disc material; *Right.* Sagittal T2 weighted image of the lumbar spine and axial T2 weighted image at L4/L5 level of 37 years old man show spontaneous regression of the disc extrusion.

Case 7

A 48-year old male patient with pain in the lumbar spine radiating in the left leg lasting for 7 months, with difficulties in walking, was referred to a neurosurgeon after heavier work. On admission, the straight leg test was positive at 90 degrees on the left leg, also the patient had sensory disturbances along dermatomes L5 and S1 to the left, no sphincter incontinence, with inclination of the body on the left during straight walking, VAS = 6/10. The patient was treated with physical therapy prior 6 months. On the MRI of the lumbar spine there was a big extrusion of the L5/S1 intervertebral disc with dorsolateral distribution to the left. An operative intervention for extirpation of the extrusion was suggested, but the patient refused. Further medical observation was suggested and after 3 months of follow-up, the patient was referred to a neurosurgeon with a control MRI of the lumbar spine with complete resolution of the extrusion (Fig. 7), resolution of the subjective problems in the right leg and VAS = 0/10. Meanwhile, he underwent physical therapy and vitamin therapy.

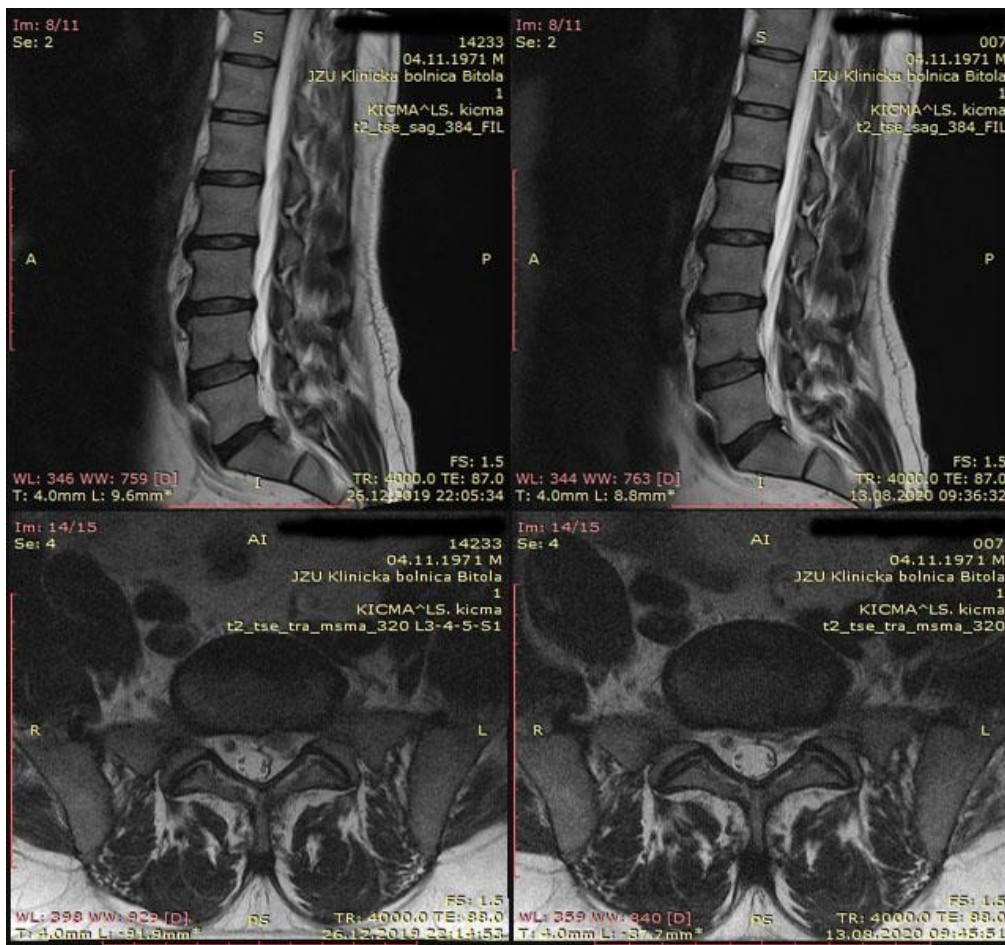


Figure 7. *Left.* Sagittal T2 weighted image of the lumbar spine and axial T2 weighted image at L5/S1 level of 48 years old man show disc extrusion with caudal migration at L5/S1; *Right.* Sagittal T2 weighted image of the lumbar spine and axial T2 weighted image at L5/S1 level of 48 years old man show spontaneous regression of the disc extrusion.

Case 8

A 40-years old female patient presents with a pain in the lumbar spine in the last 1.5 months, radiating to the right leg. In the last couple of weeks, the pain spread to the first and the second toe of the right foot. On admission, the straight leg test was positive on the right leg at 90 degrees, also she was with sensory disturbances along dermatome L5 the right, no sphincter incontinence, normal leg reflexes, no pathological reflexes, and the patient was able to walk on heels and toes, VAS = 8/10. On the MRI of the lumbar spine there is an extrusion of the L4/L5 intervertebral disc with dorsomediolateral to the right. An operative intervention for extirpation of the extrusion was suggested, but the patient refused. After 2 months of observation she had significant improvement of the subjective symptoms, the straight leg test was normal on both sides, no motility and sensory disturbances in both legs, no sphincter incontinence, VAS = 2/10. Further medical observation after 3 months of follow-up, the patient was referred to a neurosurgeon with a control MRI of the lumbar spine with complete resolution of the extrusion (Fig. 8), resolution of the subjective problems in the right leg and VAS = 0/10. Meanwhile, she underwent physical therapy and vitamin therapy.

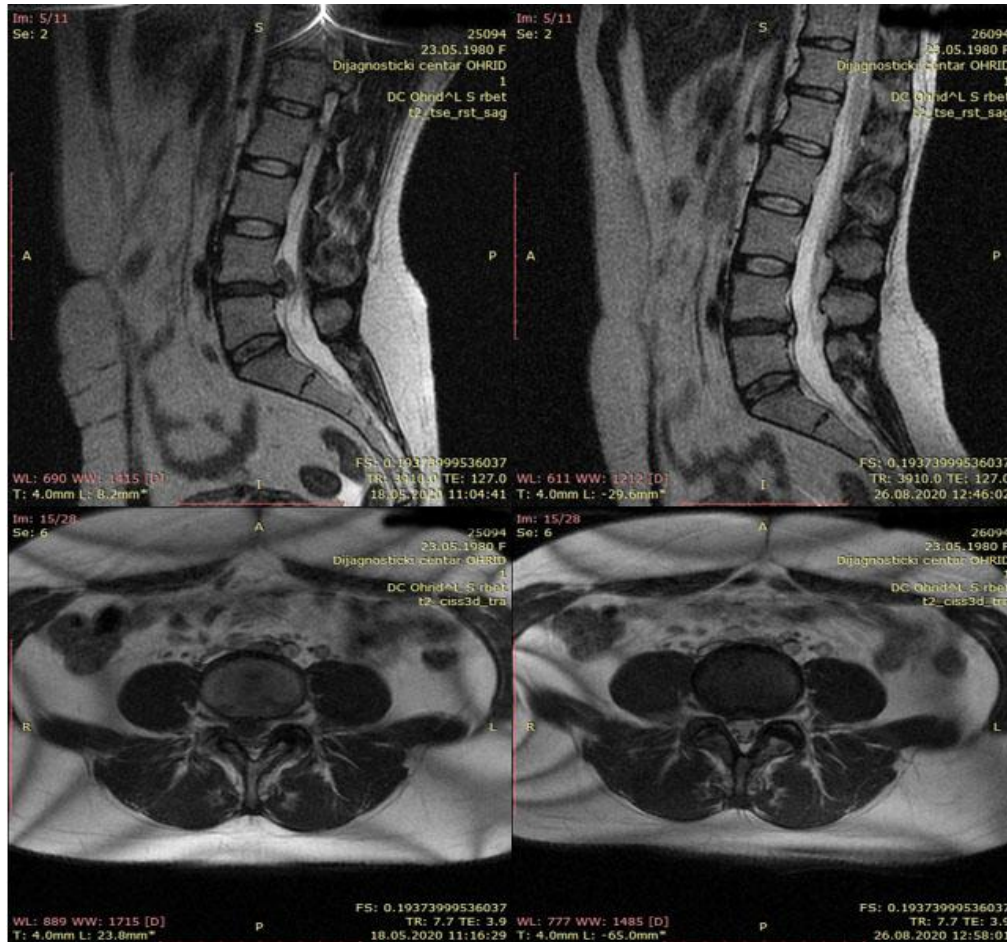


Figure 8. *Left.* Sagittal T2 weighted image of the lumbar spine and axial T2 weighted image at L4/L5 level of 40 years old woman show disc extrusion with cranial migration at L4/L5; *Right.* Sagittal T2 weighted image of the lumbar spine and axial T2 weighted image at L4/L5 level of 40 years old woman show spontaneous regression of the disc extrusion.

Case 9

A 53-years old female patient with pain in the lumbar spine in the last 3 weeks radiating in the right leg and paresthesia in the right foot in the last 3 weeks. On admission, the straight leg test was positive on the right leg at 90 degrees, the patient had sensory disturbances along dermatome S1 on the right, no sphincter incontinence, normal leg reflexes, no pathological reflexes. She was able to walk on heels and toes, but she had difficulties in walking on toes on the right leg because of pain, VAS = 7/10. On the MRI of the lumbar spine there was an extrusion of the L5/S1 intervertebral disc with dorsomediolateral to the right. An operative intervention for extirpation of the extrusion was suggested, but the patient refused. After 4 months of observation she had significant improvement of the subjective symptoms, the straight leg test was normal on both sides, no motility and sensory disturbances in both legs, no sphincter incontinence, VAS = 1/10. A control MRI of the lumbar spine with almost complete resolution of the extrusion (Fig. 9). Meanwhile, she underwent physical therapy and vitamin therapy.

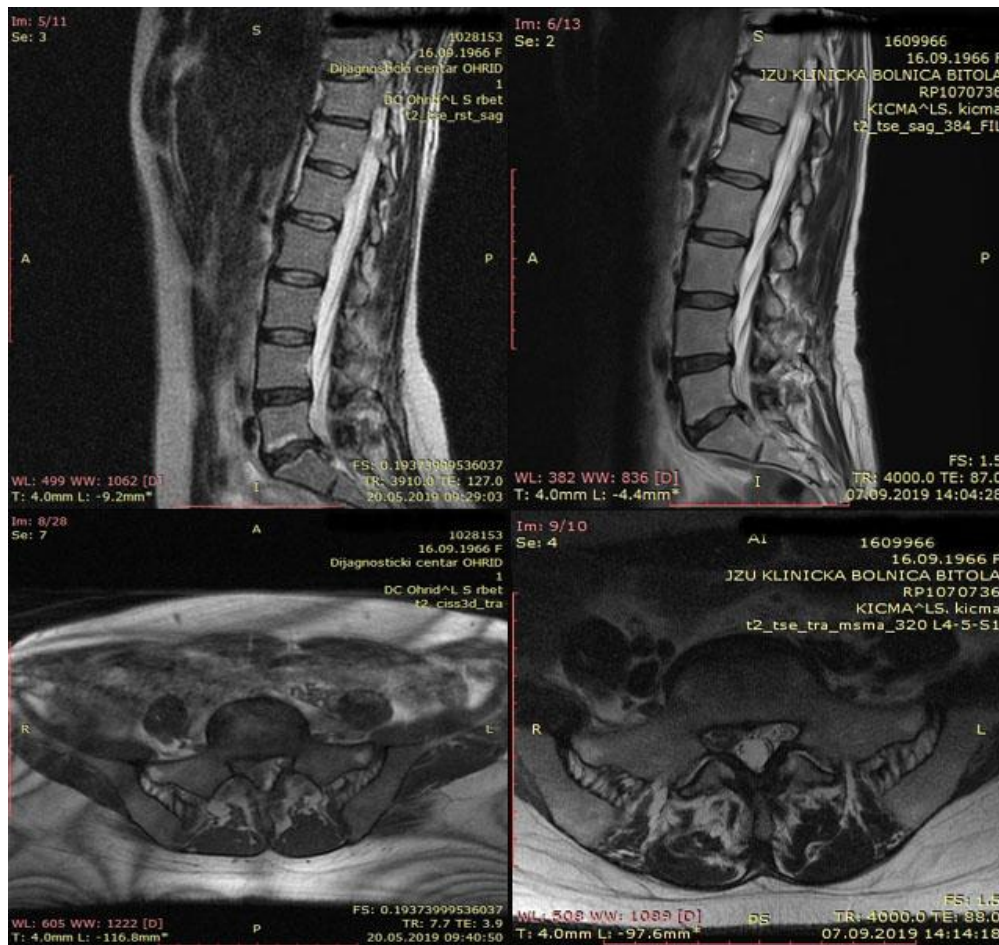


Figure 9. *Left.* Sagittal T2 weighted image of the lumbar spine and axial T2 weighted image at L5/S1 level of 53 years old woman show disc extrusion and caudal migration at L5/S1; *Right.* Sagittal T2 weighted image of the lumbar spine and axial T2 weighted image at L5/S1 level of 53 years old woman show spontaneous reduction of the extruded disc.

Discussion

The general view in the treatment approach of the lumbar disc herniation which differs from doctor's clinical experience, is to administer surgical treatment to patient groups who have intolerable aches, medium level neurologic deficits and radicular foot ache that continues despite the medical treatment for 6 weeks [13]. In spite of the fact that the surgical treatment in a short period has been the most effective treatment option in removing the acute pain, the long period results of the clinical studies support nonsurgical treatment or at least they show that the results are similar [10].

Teplitck and Haskin (1985) first documented spontaneous regression of herniated disc after confirmation via a follow-up of computed tomography scans on eleven patients [14].

There are many studies describing the possible mechanisms of spontaneous resolution of the symptoms in patients with lumbar disc herniation even in cases with severe radiculopathy [3, 7, 11, 12, 15].

Three mechanisms were proposed to explain this phenomenon. The first states that the herniated disc retracts, returning into the intervertebral space again. The second emphasizes that dehydration followed by shrinkage of the herniated disc occurs. The last mechanism advocates enzymatic degradation and phagocytosis, due to an inflammatory reaction and neovascularization, which are responsible for such reabsorption [11, 16].

A recent study from Netherlands by Djiric et al. supports the third explanations about how macrophage infiltration is positively associated with an extruded type of disc herniation as well as the extent of reduction of the herniated disc during 1-year follow-up in patients with sciatica [17]. This is an indication that the macrophages play an active role in reducing herniated discs. An extruded disc herniation has a larger surface for the macrophages to adhere to, which leads to more size reduction.

Intervertebral disc, which does not have systemic circulation, because of which the body immune system is not recognized, becomes recognizable by the immune system after extending to the epidural area which has a systemic circulation and a foreign body reaction occurs in that region [2].

The paper by Chiu Chun-Chieh et al. systemically reviews that the rate of spontaneous regression was found to be 96% for disc sequestration, 70% for disc extrusion, 41% for disc protrusion and 13% for disc bulging [18]. The rate of complete resolution of the disc herniation was 43% for sequestered discs and 15% for extruded discs [18]. This study concludes that predictive factors for spontaneous regression of lumbar herniated disc were extruded and sequestered type herniation, migrated disc, transligamentous herniation, herniation with contrast enhancement and high T2 signal intensity of the herniated disc on magnetic resonance. Disc migration is a subtype of disc extrusion and the herniation is exposed into epidural space as well as transligamentous herniation [18].

In 1996, Komori et al. reported that 78% (28/36) migrated discs regressed, whereas only 17% (7/41) non-migrated discs regressed ($P < 0.001$) [12]. Complete resolution rate was also higher in the migration group than in non-migration group in Komori's study (41% versus 0%) [19]. Matsubara et al. reported that herniations with broken PLL showed a greater degree of reduction than did the herniations with intact PLL (26% versus 9%; $P < 0.02$) [20]. Contrast enhancement of herniated disc imply that the periphery of herniated tissue is vascularized and an inflammatory stage signaling for macrophage phagocytosis. Splendaini et al. reported that 83% (25/30) of the cases with contrast enhancement showed disc resolution, which was significantly different from the cases without contrast enhancement ($P < 0.05$) [21]. Autio et al. further pointed that higher thickness of enhancement rim was also a significant determinant of disc regression [22].

High T2 signal intensity implies that herniated tissue may shrink because of dehydration. Henmi et al. found that the T2 signal intensity is higher in a herniated disc than the original disc in patients with shorted duration of illness and the T2 signal decreases over time [23].

In fact, those herniated discs with high T2 signal intensity showed higher reduction ratio than those with low T2 signal intensity. These predictive factors lead the focus to the mechanism of how herniated disc regressed and even completely disappeared.

Some studies find complete resolution or significant high regression rate (discs reducing more than 70%) in which there is a better correlation between disc regression and clinical outcome. There were eight cases of complete disc resolution in Takada et al. study, [24] all of the eight cases had excellent or good outcome. Bozzao et al. followed up 46 patients and observed 61% (19/31) patients whose disc size reduction, more than 70%, had a complete resolution of clinical outcome, while none of the other patients whose disc size reduction was less than 70%. [4].

Most spontaneous disc regression happened within the first year, [22, 24] however disc regression could be observed within the first two [22] or three months [24]. In Takada et al.'s study there were 27% (10/37) spontaneous disc regression found three months from the onset and the disc sequestrations were more prone to regress earlier than disc extrusions or protrusions [24].

The other interesting observation is the fact that disc regression group had better clinical improvement than slow regression group [22].

Autio et al. did follow-up MRI scans at 2 months and 12 months after baseline scan. This study found that leg pain intensity and Oswestry disability decreased significantly more in the fast resorption group (more than 40% decrease in herniation volume at 2 months) compared to slow resorption group [22].

The clinical impact of the spontaneous disc herniation resorption reflects a gradual change in management protocols, prioritizing the initial conservative treatment. Weber's study estimated that in one year of evolution, 25% of the patients initially managed conservatively would require surgery [25]. In a larger study, only 15% of the patients managed conservatively needed surgery within 3 months [26].

This shows the importance of initially trying the conservative approach. Saal and Saal demonstrated that the conservative management of lumbar disc herniation with radiculopathy was considered efficacious in 90% of the patients [27].

The pain in sciatica can be explained either by the nervous compression by the hernia or by the radicular inflammation and blood congestion. Radicular pain relief is justifiable in some cases before the reduction in size of the hernia, as a result of improvement of secondary inflammatory responses. Pain usually reduces in 3-6 weeks, while hernia reabsorption takes 4-9 months [28].

Rothoerl et al. analyzed the time of the onset of symptoms in a surgically treated group, comparing with postoperative outcomes, to define when to indicate surgery to obtain the best possible results. The conclusion was that the conservative treatment should be tried 2 months previously, during which time the pain should have presented a regression. After this period, a surgery should be considered [29].

Patients with sciatica in my country, are generally treated by general practitioners with conservative therapy for 2 weeks and after that they are referred to a specialist such as a neurologist, an orthopedist, a neurosurgeon or a general surgeon for further examinations and treatment. If the magnetic resonance presents lumbar extrusion with disc fragmentation or sequestration, there is a big possibility for spontaneous resorption of the herniated disc, so the operative intervention would not be necessary considering the neurologic exam as well.

The subjects with spontaneous regression of the lumbar disc extrusions presented in our study show that the presence of nucleus pulposus in extruded lumbar discs into the epidural space may lead to natural spontaneous outcome of sciatica.

Conclusion

Cases present patients with sciatica caused by lumbar disc extrusion which resolved spontaneously without surgery. Patients should be indicated for magnetic resonance imaging for precise indications, not only for acute onset of leg pain caused by sciatica. The conservative treatment may be an option of choice for extruded lumbar disc herniation in cases in which patient are relieved of symptoms and the disc has protruded through the posterior longitudinal ligament, so the spontaneous resolution is expected, however, with close observation of the patient.

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