

Spontaneous regression of a large sequestered lumbar disc herniation: a case report and literature review

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Chengxiang Hu^{1,2}, Baocheng Lin¹, Zhixing Li¹,
Xiaozhuan Chen¹ and Kun Gao³ 

Abstract

Lumbar disc herniation is a common disorder in adults that is accompanied by lower back and radicular pain. A 32-year-old man visited our clinic with 1-week history of persistent lower back pain and weakness in his right big toe. Magnetic resonance imaging (MRI) of his lumbar spine revealed herniated discs at L3/L4, L5/S1 and L4/L5, where a right-sided intraspinal mass lesion deep to the L4 vertebral body was causing compression of the nerve root. The patient underwent conservative treatment and reported no symptoms referable to his back or leg 4 months later. Follow-up MRI showed no herniation of the nucleus pulposus at the L4/L5 level or lesion deep to the vertebral body of L4, whereas no changes had occurred to the status of the herniated L3/L4 and L5/S1 discs. The present case and a literature review show that a sequestered lumbar disc herniation can regress within a relatively short timeframe without surgery. The authors emphasise the utility of conservative therapy for patients who do not have a definitive surgical indication.

Keywords

Disc herniation, spontaneous regression, lower back pain, lumbar spine, intraspinal mass lesion, conservative therapy

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¹Department of Joints and Soft Tissue Injury, The Fourth Clinical Medical College of Guangzhou University of Chinese Medicine, Shenzhen, China

²Guangzhou University of Chinese Medicine, Clinical Medical College of Acupuncture, Moxibustion and Rehabilitation, Guangzhou, China

³Department of Orthopaedics, The Fourth Clinical Medical College of Guangzhou University of Chinese Medicine, Shenzhen, China

Corresponding author:

Kun Gao, Department of Orthopaedics, The Fourth Clinical Medical College of Guangzhou University of Chinese Medicine; No. 1, Fuhua Road, Futian District, Shenzhen 518033, China.
Email: xuqianyu@126.com



Introduction

Lumbar disc herniation is a common disease, with an estimated incidence of 5% in adults.¹ Dandy² first described the clinical symptoms of radiculopathy resulting from disc herniation in 1929. Later, in 1934, Mixter and Barr³ successfully performed surgery on patients with evidence of intervertebral disc rupture. Subsequent studies^{4,5} have shown that patients who undergo surgery early display faster pain relief and sensory recovery. In contrast, several clinical studies^{6,7} have shown no differences in outcomes between surgical and conservative care after 2 years, except that early surgery is associated with faster pain relief and recovery than non-surgical treatment. Furthermore,⁸ surgery has been shown to be associated with significantly better outcomes than conservative management after 1 year, but no differences after 4 or 10 years. Finally, other studies⁹⁻³¹ have documented cases of excellent spontaneous lumbar disc regression following non-surgical treatment.

The exact mechanisms of the spontaneous regression of lumbar disc herniation remain to be determined.^{27,32,33} However, three principal hypotheses have been posited:^{1,34,35} dehydration and shrinkage, retraction, and inflammation and neovascularisation. Moreover, some previous studies^{36,37} have shown a relationship between the resolution of lumbar disc herniation and other factors. In the present article, we report a case of the spontaneous regression of lumbar disc herniation and review the related literature. The patient provided his informed consent for publication of the case details.

Case

The reporting of this study conformed to the CARE guidelines.³⁸ A 32-year-old man visited our clinic with a 1-week history

of persistent lower back pain and weakness in his right big toe. Physical examination showed muscle weakness (grade 3/5) of his right *extensor hallucis longus*, with reductions in sensation over the L4 dermatome and the ability to raise his lower right leg by 40° while straight, but no incontinence. Magnetic resonance imaging (MRI) of his lumbar spine revealed herniated discs at L3/L4, L5/S1 and L4/L5, where there was a right-sided intraspinal mass-like lesion that extended deep to the L4 vertebral body, which was causing compression of the nerve root (Figure 1). The differential diagnosis of the intraspinal mass-like lesion included sequestered disc herniation and tumour, such as schwannoma or neurofibroma. Rim-enhanced MRI was conducted 4 days later, and showed a large nucleus pulposus herniation (Figure 2). The patient declined surgery in favour of conservative treatment, and agreed to undergo physical therapy, to sleep on a hard/firm mattress and to perform exercises, without taking medication. His lower back pain and leg numbness were gradually relieved and the patient reported no symptoms relating to his back or leg after 4 months. At follow-up examination, both physical examination and the straight-leg raising test yielded normal results, and MRI showed no herniation of the nucleus pulposus at the L4/L5 level, whereas the herniation status of the L3/L4 and L5/S1 discs was unchanged (Figure 3). Subsequent physical therapy, consisting of acupuncture and massage, helped to relieve the patient's pain and numbness, and ongoing exercise maintained his quality of life.

Discussion

The incidence of lumbar disc herniation in adults is approximately 5% and rising.¹ Following the development and rapid expansion of the use of a surgical intervertebral disc approach, a survey of 817

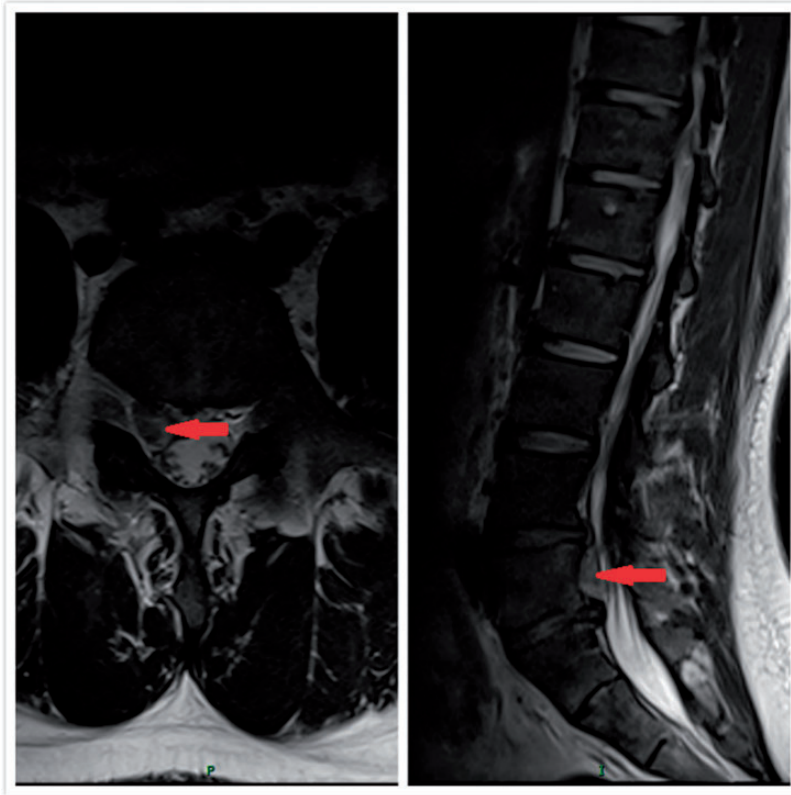


Figure 1. T2-weighted sagittal (left) and axial (right) magnetic resonance images showing an intraspinal mass-like lesion at the L4/L5 level and deep to the vertebral body of L4 (arrows), which was causing compression of the nerve root.

surgeons from 89 countries indicated that as many as 76 disc procedures were being performed per surgeon per year in 2015.³⁹ Since the first clinical report of the spontaneous regression of disc herniation was published by Guinto *et al.*⁴⁰ in 1984, increasing numbers of such instances have been reported, alongside the development of the widespread use of computed tomography and MRI. Recently, a study of 64 patients found that most showed complete resolution of their lumbar disc herniation after a mean of 17 months, and that their symptoms and function improved with conservative treatment.⁴¹ The present case illustrates the possibility of achieving spontaneous disc regression without surgical

management. However, we stress the importance of decompressive surgery when there is a significant motor deficit or *cauda equina* syndrome to avoid serious neurological sequelae and/or incontinence. Here, we will discuss the present case alongside the details of other published cases, to analyse the factors associated with the spontaneous regression of a herniated lumbar disc.

We reviewed all the published case reports regarding patients diagnosed with spontaneous lumbar disc regression who underwent follow-up MRI. Cases that involved infectious, neoplastic, metabolic and/or congenital causes of lumbar disc herniation were excluded. The 31 cases discussed in the manuscript met all the

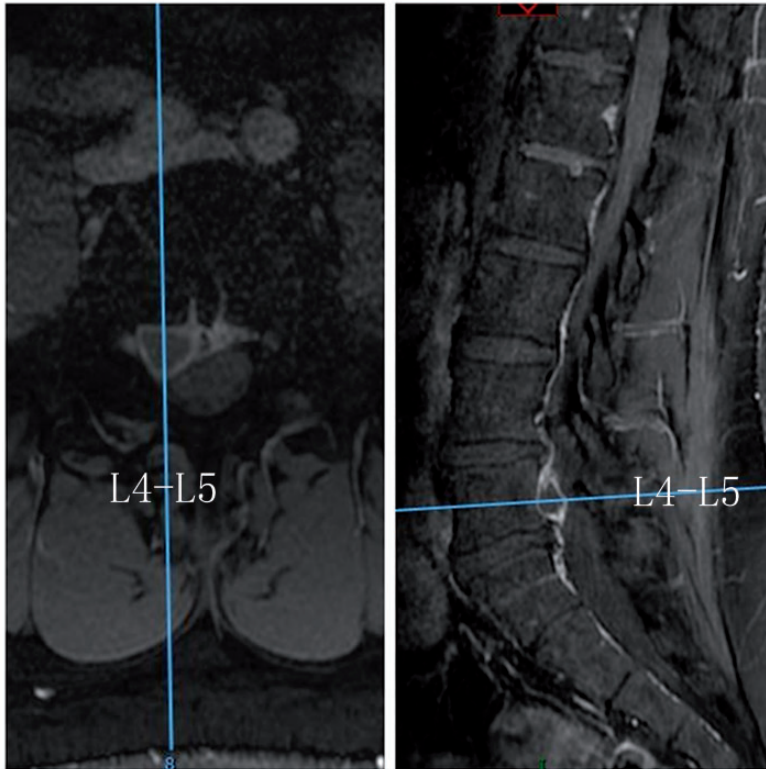


Figure 2. Post-gadolinium T1-weighted sagittal (left) and axial (right) rim enhancement magnetic resonance image obtained 4 days after the initial images shown in Figure 1, showing a large nucleus pulposus herniation at the L4/L5 level (arrows).

inclusion and exclusion criteria. The comprehensive information collected included age, sex, location, classification of disc herniation, symptoms, defects on the neurological examination performed, and the time to resolution on MRI (Table 1). In 32 cases (including the present case) there was spontaneous regression of a herniated lumbar disc (Table 1). The mean age of the patients was 46.4 years and 71.0% were male. The locations of the disc herniations were L1/L2 (two cases, 6.3%), L2/L3 (one case, 3.1%), L3/L4 (eight cases, 25.0%), L4/L5 (13 cases, 43.8%), and L5/S1 (seven cases, 21.9%). Most of the cases (56.3%) of herniation involved sequestration and the rest (43.7%) were of the extrusion subtype. The

case reports showed that 65.6% of the cases had lower back pain, 87.5% had radicular pain and 59.4% had both types. They also showed that 40.6% of the patients had a positive straight-leg raising test, 43.8% had sensory disturbances and 34.4% had motor weakness. The mean time to spontaneous lumbar disc regression was 10.1 months, the mean time to sequestration was 6.8 months and the mean time to extrusion was 14.4 months. The present case manifested the sequestration subtype and there was therefore a good chance that spontaneous regression would occur. In contrast to some of the other cases, the present patient only underwent physical therapy (acupuncture and massage) and

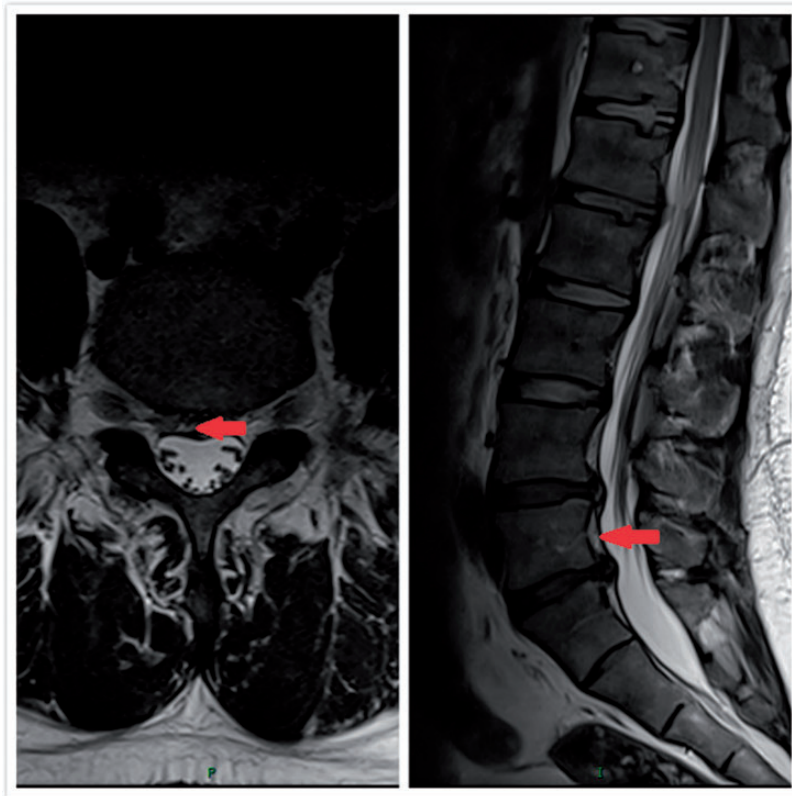


Figure 3. T2-weighted sagittal (left) and axial (right) magnetic resonance images showing the absence of the nucleus pulposus herniation (arrows) 4 months after the initial visit.

performed exercises, but did not take medication. Our experience with the present case and the literature review suggest that rim enhancement MRI should be used to predict the spontaneous regression of lumbar disc herniation.

Previous studies have suggested various hypotheses for the mechanism of spontaneous disc regression. For example, the dehydration theory states that the nucleus pulposus herniation might shrink back into the annulus fibrosus as a result of gradual dehydration.^{32,42} A second hypothesis states that a herniated disc might retract back into the intervertebral space if it protrudes through the annulus fibrosus without separating from it.⁹ A third hypothesis concerns inflammation and

neovascularisation: lumbar disc herniation into the epidural space causes inflammation and neovascularisation, with gradual resorption of the cartilage through enzymatic degradation and phagocytosis.^{1,34} However, in our opinion, both dehydration and inflammation and neovascularisation may be involved in the process of disc herniation, and especially in nucleus pulposus herniation.

Although the exact mechanisms of the resolution of a herniated disc without surgery remain unclear, some previous studies have shown a relationship between the spontaneous resolution of lumbar disc herniation and other factors. Bozzao *et al.*³³ demonstrated a positive correlation between the size of a herniated disc and

Table 1. Summary of cases involving spontaneous regression of lumbar disc herniation.

First author [Reference number]	Age/Sex	Location	Classification of disc herniation	Symptoms	Defects on neurological examination	Follow-up
Yang X [23]	45/M	L3-L4/left	Sequestration	LBP, RP	SLRT(+), SD, knee-jerk reflex (decrease)	9 months
Ribeiro RP [29]	34/M	L5-S1/right	Extrusion	LBP, RP	SLRT(+), weakness, SD	3 months
Gao S [21]	40s/M	L3-L4/	Extrusion	RP	SLRT(+), weakness, SD	8 months
Hong J [35]	29/F	L4-L5/	Extrusion	RP	SD	5 months
Kim ES [22]	58/M	L3-L4/left	Sequestration	LBP, RP	Weakness, SD	9 months
	58/F	L2-L3/left	Extrusion	LBP, RP	Weakness, SD	2 months
Çi̇tişli V [34]	55/F	L5-S1/central	Extrusion	LBP, RP	SLRT(-), reflexes (normal)	6 months
Oktaş K [27]	36/M	L5-S1/right	Sequestration	LBP, RP	SD	9 months
	56/M	L4-L5/central	Sequestration	LBP, RP	Weakness, cauda equina syndrome	6 months
	46/M	L1-L2/Left	Extrusion	LBP	SD	9 months
	31/M	L5-S1/right	Sequestration	LBP, RP	SLRT(+), SD	3 months
	41/M	L5-S1/right	Sequestration	LBP, RP	SLRT(+), SD	12 months
Reddy UV [28]	40/F	L4-L5/right	Sequestration	LBP, RP	Normal	6 months
Kim KD [18]	59/M	L3-L4/left	Sequestration	Not reported	Not reported	4 months
Jung Y [24]	32/F	L4-L5/central	Extrusion	LBP, RP	SLRT(+)	18 months
Macki M [26]	35/M	L4-L5/left	Sequestration	LBP, RP	Not reported	5 months
Kim SG [42]	64/M	L3-L4/right	Sequestration	RP	Weakness	3 months
	74/M	L1-L2/right	Extrusion	RP	No weakness	3 months
	67/M	L4-L5/right	Sequestration	RP	Not reported	9 months
Slavin KV [14]	23/M	L5-S1/central	Sequestration	LBP, RP	SLRT(+)	8 months
Reyentovich A [12]	44/M	L4-L5/right	Sequestration	LBP, RP	SLRT(-), weakness, SD	13 months
Chang DG [19]	Not reported	L4-L5/central	Extrusion	LBP, RP	SLRT(+)	20 months
Keski̇l S [15]	49/M	L3-L4/central	Extrusion	LBP, RP	SLRT(+)	12 months
	51/F	L3-L4/right	Extrusion	RP	Achilles reflex (loss)	10 months
	44/M	L4-L5/left	Sequestration	RP	Achilles reflex (loss)	7 months
	37/M	L3-L4/left	Extrusion	RP	SLRT(+)	7 years
Ryu SJ [20]	53/F	L4-L5/left	Sequestration	LBP, RP	SLRT(-)	6 months
Monument M [30]	57/M	L4-L5/left	Extrusion	RP	Weakness, SD	6 months
Nozawa S [13]	33/M	L4-L5/right	Sequestration	LBP	Weakness, SD	3 months
Tokmak M [25]	45/F	L5-S1/right	Extrusion	LBP, RP	SLRT(+), SD, Achilles reflex (decrease),	15 months
Gelabert-González M [31]	65/F	L4-L5/left	Sequestration	LBP, RP	SLRT(+), weakness	7 months
Present case	32/M	L4-L5/right	Sequestration	LBP	SLRT(+), SD, weakness,	4 months

LBP: lower back pain, RP: radicular pain, SLRT: straight-leg raising test. SD: sensory disturbance.

the amount of reduction, but no relationship between the reduction of disc herniation and the location of the herniation. Similarly, Splendiani *et al.*⁴³ found that the evolution of disc herniation showed no relationships with location, size, or level. The classification of disc herniation might be important for disc regression. For example, Virri *et al.*⁴⁴ found that sequestered disc material contained more macrophages and involved a more intense inflammatory reaction than an extruded disc. Autio *et al.*³⁶ found a higher incidence of disc regression in patients of 41 to 50 years. Komori *et al.*¹ concluded that the migration of a herniated disc facilitated the resorption of a herniated nucleus pulposus because of greater vascular supply. Autio *et al.*³⁶ suggested that the thickness of the region of enhancement on the baseline MRI is the best predictor of the regression of disc herniation, with greater thickness being positively associated with absorption of the herniated nucleus pulposus.

The relationships between clinical outcomes and spontaneous disc regression require further study. Oktay *et al.*²⁷ showed that a decrease in the herniation ratio of over 20% is associated with clinical improvement, but Hong *et al.*⁴⁵ found that patients whose disc herniation does not improve radiologically can also show amelioration of symptoms. However, other studies^{25,34} have shown that lumbar disc herniation can disappear after treatment using pain relief alone, or that symptoms may reappear.

Conclusions

The details of the present case and literature review imply that patients with the sequestration subtype of disc herniation are significantly more likely to show spontaneous regression than those with bulging or protruding discs. Rim enhancement MRI should be used to predict the regression of

lumbar disc herniation. For patients with a large herniated lumbar disc, especially if it is of the extrusion or sequestration subtypes, conservative treatment is preferable in the absence of definitive surgical indications.

Declaration of conflicting interest

The authors declare that there is no conflict of interest.


Ethics statement

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. This case was approved for publication by the Ethics Committee of Shenzhen Traditional Chinese Medicine Hospital (K2019-001-01). Written informed consent was obtained from the patient to publish this case report.

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ORCID iD

Kun Gao  <https://orcid.org/0000-0003-0323-4219>

References

1. Komori H, Shinomiya K, Nakai O, et al. The natural history of herniated nucleus pulposus with radiculopathy. *Spine (Phila Pa 1976)* 1996; 21: 225–229.
2. Dandy WE. Loose cartilage from intervertebral disk simulating tumor of the spinal cord. By Walter E. Dandy, 1929. *Clin Orthop Relat Res* 1989: 4–8.
3. Mixter WJ and Barr JS. Rupture of the Intervertebral Disc with Involvement of the Spinal Canal. *N Engl J Med* 1934; 211: 210–215.

4. Turk O, Antar V and Yaldiz C. Spontaneous regression of herniated nucleus pulposus: The clinical findings of 76 patients. *Medicine (Baltimore)* 2019; 98: e14667.
5. Hu Y, Gu YJ, Xu RM, et al. Short-term clinical observation of the Dynesys neutralization system for the treatment of degenerative disease of the lumbar vertebrae. *Orthop Surg* 2011; 3: 167–175.
6. Peul WC, Van Den Hout WB, Brand R, et al. Prolonged conservative care versus early surgery in patients with sciatica caused by lumbar disc herniation: two year results of a randomised controlled trial. *BMJ* 2008; 336: 1355–1358.
7. Peul WC, Van Houwelingen HC, Van Den Hout WB, et al. Surgery versus prolonged conservative treatment for sciatica. *N Engl J Med* 2007; 356: 2245–2256.
8. Weber H. Lumbar disc herniation. A controlled, prospective study with ten years of observation. *Spine (Phila Pa 1976)* 1983; 8: 131–140.
9. Teplick JG and Haskin ME. Spontaneous regression of herniated nucleus pulposus. *AJR Am J Roentgenol* 1985; 145: 371–375.
10. Newlands JC. Spontaneous resolution of a disc protrusion in a military aviator: a case report. *Aviat Space Environ Med* 1997; 68: 334–336.
11. Fager CA. Observations on spontaneous recovery from intervertebral disc herniation. *Surg Neurol* 1994; 42: 282–286.
12. Reyentovich A and Abdu WA. Multiple independent, sequential, and spontaneously resolving lumbar intervertebral disc herniations: a case report. *Spine (Phila Pa 1976)* 2002; 27: 549–553.
13. Nozawa S, Nozawa A, Kojima H, et al. Spontaneous disappearance of lumbar disc herniation within 3 months. *Orthopedics* 2009; 32: 852.
14. Slavin KV, Raja A, Thornton J, et al. Spontaneous regression of a large lumbar disc herniation: report of an illustrative case. *Surg Neurol* 2001; 56: 333–336; Discussion 337.
15. Keskil S, Ayberk G, Evliyaoglu C, et al. Spontaneous resolution of “protruded” lumbar discs. *Minim Invasive Neurosurg* 2004; 47: 226–229.
16. Sei A, Nakamura T, Fukuyama S, et al. [Spontaneous regression of lumbar hernia of the nucleus pulposus. Follow-up study of 4 cases by repeated magnetic resonance imaging]. *Rev Chir Orthop Reparatrice Appar Mot* 1994; 80: 144–149.
17. Longo M, Ascenti G, Noto G, et al. [A case of spontaneous and stabilized regression of lumbar disk herniation]. *Radiol Med* 1990; 80: 754–756.
18. Kim KD and Kim ES. Unknown case: part 2. Spontaneous regression of herniated disc. *Spine (Phila Pa 1976)* 2013; 38: 368.
19. Chang DG, Shymon S and Powell AJ. Natural resolution of a herniated lumbar disc. *BMJ Case Rep* 2013; 2013: bcr2013201037.
20. Ryu SJ and Kim IS. Spontaneous regression of a large lumbar disc extrusion. *J Korean Neurosurg Soc* 2010; 48: 285–287.
21. Gao S, Geng X and Fang Q. Spontaneous Disappearance of Large Lumbar Disk Herniation. *JAMA Neurol* 2018; 75: 123–124.
22. Kim ES, Oladunjoye AO, Li JA, et al. Spontaneous regression of herniated lumbar discs. *J Clin Neurosci* 2014; 21: 909–913.
23. Yang X, Zhang Q, Hao X, et al. Spontaneous regression of herniated lumbar discs: Report of one illustrative case and review of the literature. *Clin Neurol Neurosurg* 2016; 143: 86–89.
24. Jung YJ, Shin JS, Lee J, et al. Delayed Spontaneous Resorption of Lumbar Intervertebral Disc Herniation: A Case Report. *Altern Ther Health Med* 2017; 23: 58–63.
25. Tokmak M, Altioek IB, Guven M, et al. Spontaneous Regression of Lumbar Disc Herniation After Weight Loss: Case Report. *Turk Neurosurg* 2015; 25: 657–661.
26. Macki M, Hernandez-Hermann M, Bydon M, et al. Spontaneous regression of sequestered lumbar disc herniations: Literature review. *Clin Neurol Neurosurg* 2014; 120: 136–141.
27. Oktay K, Ozsoy KM, Dere UA, et al. Spontaneous regression of lumbar disc herniations: A retrospective analysis of 5

- patients. *Niger J Clin Pract* 2019; 22: 1785–1789.
28. Reddy U, Agrawal A, Hegde K, et al. Spontaneously disappearing large herniated lumbar disc fragment. *J Orthop Allied Sci* 2014; 2: 26–28.
 29. Ribeiro RP, Matos RM, Vieira A, et al. [Spontaneous regression of symptomatic lumbar disc herniation]. *Acta Reumatol Port* 2011; 36: 396–398.
 30. Monument MJ and Salo PT. Spontaneous regression of a lumbar disk herniation. *CMAJ* 2011; 183: 823.
 31. Gelabert-Gonzalez M, Serramito-Garcia R, Aran-Echabe E, et al. [Spontaneous resolution of a lumbar disc herniation]. *Neurocirugia (Astur)* 2007; 18: 138–140.
 32. Benoist M. The natural history of lumbar disc herniation and radiculopathy. *Joint Bone Spine* 2002; 69: 155–160.
 33. Bozzao A, Gallucci M, Masciocchi C, et al. Lumbar disk herniation: MR imaging assessment of natural history in patients treated without surgery. *Radiology* 1992; 185: 135–141.
 34. Citisli V and Ibrahimoglu M. Spontaneous remission of a big subligamentous extruded disc herniation: case report and review of the literature. *Korean J Spine* 2015; 12: 19–21.
 35. Hong J and Ball PA. IMAGES IN CLINICAL MEDICINE. Resolution of Lumbar Disk Herniation without Surgery. *N Engl J Med* 2016; 374: 1564.
 36. Autio RA, Karppinen J, Niinimäki J, et al. Determinants of spontaneous resorption of intervertebral disc herniations. *Spine (Phila Pa 1976)* 2006; 31: 1247–1252.
 37. Ahn SH, Ahn MW and Byun WM. Effect of the transligamentous extension of lumbar disc herniations on their regression and the clinical outcome of sciatica. *Spine (Phila Pa 1976)* 2000; 25: 475–480.
 38. Gagnier JJ, Kienle G, Altman DG, et al. The CARE guidelines: consensus-based clinical case reporting guideline development. *Headache* 2013; 53: 1541–1547.
 39. Gadjradj PS, Arts MP, Van Tulder MW, et al. Management of Symptomatic Lumbar Disk Herniation: An International Perspective. *Spine (Phila Pa 1976)* 2017; 42: 1826–1834.
 40. Guinto FC Jr, Hashim H and Stumer M. CT demonstration of disk regression after conservative therapy. *AJNR Am J Neuroradiol* 1984; 5: 632–633.
 41. Kesikburun B, Eksioğlu E, Turan A, et al. Spontaneous regression of extruded lumbar disc herniation: Correlation with clinical outcome. *Pak J Med Sci* 2019; 35: 974–980.
 42. Kim SG, Yang JC, Kim TW, et al. Spontaneous regression of extruded lumbar disc herniation: three cases report. *Korean J Spine* 2013; 10: 78–81.
 43. Splendiani A, Puglielli E, De Amicis R, et al. Spontaneous resolution of lumbar disk herniation: predictive signs for prognostic evaluation. *Neuroradiology* 2004; 46: 916–922.
 44. Virri J, Gronblad M, Seitsalo S, et al. Comparison of the prevalence of inflammatory cells in subtypes of disc herniations and associations with straight leg raising. *Spine (Phila Pa 1976)* 2001; 26: 2311–2315.
 45. Hong SJ, Kim DY, Kim H, et al. Resorption of Massive Lumbar Disc Herniation on MRI Treated with Epidural Steroid Injection: A Retrospective Study of 28 Cases. *Pain Physician* 2016; 19: 381–388.