

# Hydrogel Implant Causing Lumbar Radiculopathy: A Case Report

Azmi Tufan<sup>1</sup>, Abdurrahim Tas<sup>2</sup>, Feyza Karagoz Guzey<sup>1</sup>, Ozgur Yusuf Aktas<sup>1</sup>, Burak Eren<sup>1</sup>, Ilker Gulec<sup>1</sup>,  
Mustafa Ornek<sup>1</sup>, Eyup Cetin<sup>1</sup>



## ABSTRACT

**Objective:** One of the new treatment methods for lumbar degenerative disc disease is percutaneous application of a hydrogel implant into the intervertebral disc. The aim of this method is to increase the disc height, to widen the neural foramen, and to decrease discogenic pain and leg pain caused by root compression. However, there may be serious complications related to intervertebral hydrogel implants that have been increasingly used during the last few years because of their minimally-invasive nature. A case with lumbar root compression due to hydrogel implant is being reported.

**Case Report:** A 61-year-old male was admitted with severe left leg pain due to compression of the left L5 root by a hydrogel implant that had been percutaneously introduced into the L4-5 disc level 6 months ago. On magnetic resonance imaging, a lesion compressing the left L5 root at the L4-5 disc level and mimicking a disc herniation was seen. It was hypointense on T1-weighted and hyperintense on T2-weighted sections. The implant was removed by an open surgery.

**Conclusion:** An intervertebral hydrogel implant swells up by absorbing water from adjacent tissues. Actually, this is the main mechanism of action by which it provides an increase of disc height. However, if it swells up excessively, it may spill over through the spinal canal and thus cause root or dural sac compression and neurological compromise.

**Keywords:** intervertebral hydrogel implant, lumbar disc herniation, root compression

## ÖZET

Lomber radikülopatiyeye neden olan hidrojel implant: Olgu sunumu

**Amaç:** Lomber dejeneratif disk hastalığının yeni tedavi yöntemlerinden biri intervertebral disk içine perkutan hidrojel implant yerleştirilmesidir. Bu yöntemle disk yüksekliğinin artması ve foramenlerin genişlemesi, bu sayede diskojenik ağrının ve kök basısına bağlı ağrının ortadan kaldırılması amaçlanır. Son birkaç yıldır minimal invaziv bir yöntem olduğu için giderek kullanımı artan bu yöntemin ne yazık ki ciddi komplikasyonları olabilmektedir. Hidrojel implant basısına bağlı lomber kök basısı olan bir olgu sunuldu.

**Olgu Sunumu:** Altmış bir yaşında erkek hasta 6 ay önce L4-5 seviyesine perkutan olarak uygulanmış hidrojel implantın neden olduğu sol L5-kök basısına bağlı şiddetli sol bacak ağrısı ile başvurdu. Manyetik rezonans görüntülemesinde L4-5 disk seviyesi düzeyinde sol L5 köküne basan ve lomber disk hernisine benzeyen bir lezyon görüldü. Lezyon T1 ağırlıklı kesitlerde hipointens, T2 ağırlıklı kesitlerde hiperintens görünümdeydi. İmplant açık cerrahi girişimle çıkarıldı.

**Sonuç:** İntervertebral hidrojel implant komşu dokulardan su çekerek şişer. Aslında disk yüksekliğinin artmasını sağlayan asıl mekanizma da budur. Ancak eğer çok fazla şişerse, spinal kanal içine taşıp kök ya da dural kese basısına ve nörolojik bulgulara neden olabilir.

**Anahtar kelimeler:** intervertebral hidrojel implant, kök basısı, lomber disk hernisi

<sup>1</sup>Health Sciences University, Bagcilar Training and Research Hospital, Neurosurgery Clinic, Istanbul-Turkey

<sup>2</sup>Health Sciences University, Kanuni Sultan Suleyman Training and Research Hospital, Beylikduzu State Hospital, Neurosurgery Clinic, Istanbul-Turkey

## Corresponding author:

Abdurrahim Tas,  
Health Sciences University, Kanuni Sultan Suleyman Training and Research Hospital, Beylikduzu State Hospital, Neurosurgery Clinic, Istanbul-Turkey  
**E-mail address:** drabdurrahimtas@gmail.com

**Date of submission:** September 06, 2017

**Date of acceptance:** September 13, 2017

## Introduction

Minimally invasive surgical methods in spinal surgery have been increasingly chosen during the last years. New smart techniques provide more successful results with less tissue

damage. However, in some cases there may be serious complications with minimally invasive methods, too. The use of an intervertebral hydrogel implant is one of the new minimally invasive techniques used in the treatment of intervertebral disc disease. It leads to an increase of the height

of the intervertebral disc as it is swelling by absorbing water from the adjacent tissue (1,2). As a result, the neural foramina widen and root compression is decreased. A big advantage of this implant is that it can be performed percutaneously without serious tissue damage.

In this paper, we report a case with L5 root compression due to hydrogel implant performed a few months ago.

## Case Report

A 61-year-old male was admitted to our outpatient clinic with complaints of low back and severe left leg pain. His history revealed that he had suffered from low back pain for 2 years and had been treated with a percutaneous hydrogel implantation into his degenerated L4-5 disc level (Figure 1) in the Pain Clinic at our hospital. A very severe left leg pain

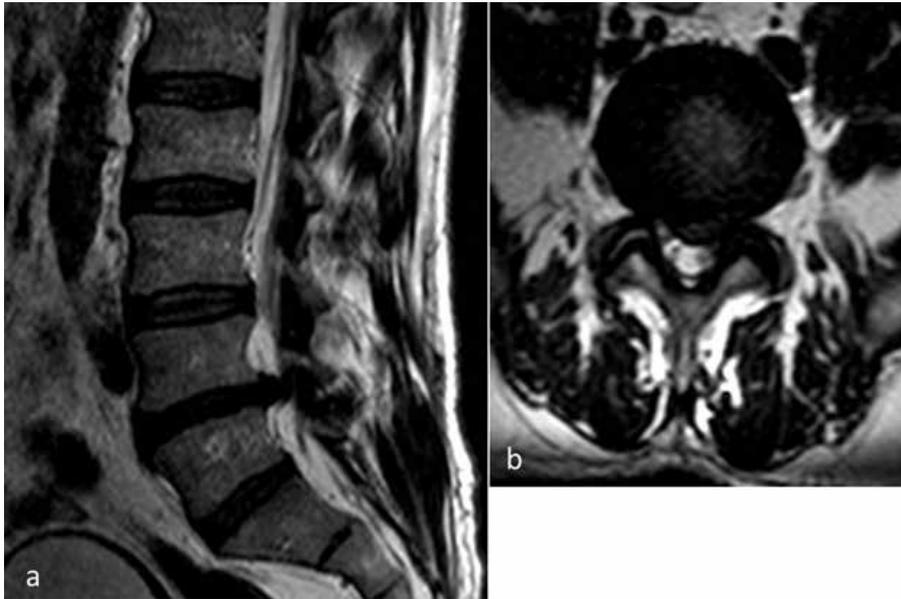


Figure 1: A left L4-5 lumbar disc herniation with a wide basis was seen on the T2-weighted sagittal (a) and axial (b) MRI sections before percutaneous hydrogel implantation.

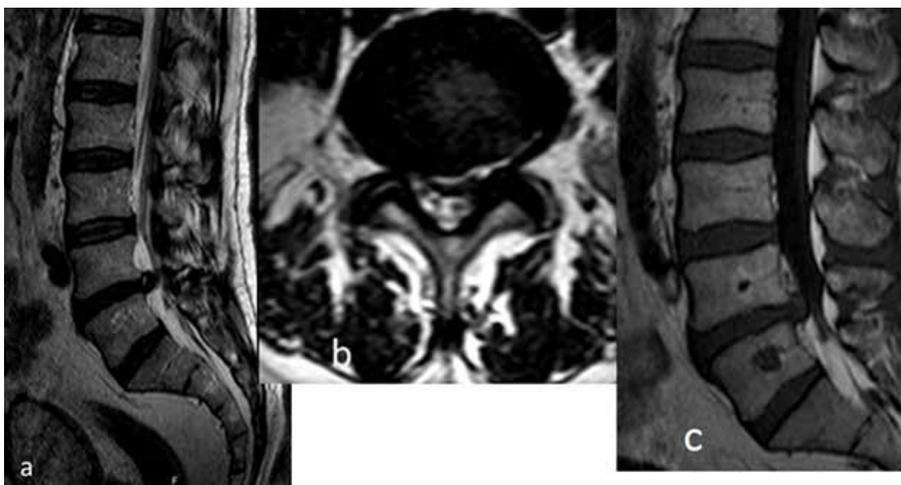
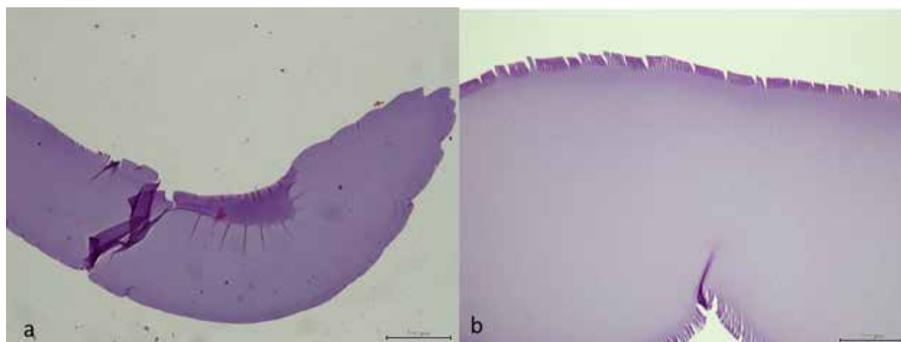


Figure 2: A lesion mimicking lumbar disc herniation and annular defect was seen on the T2-weighted sagittal (a), T2-weighted axial (b), and T1 weighted sagittal (c) MRI sections 6 months after percutaneous hydrogel implantation. It was noted that the lesion was hyperintense on T2-weighted and hypointense on T1-weighted MRI section.



**Figure 3: The microscopic appearance of the hydrogel material that was removed from the epidural space. a) Hematoxylin-Eosin (HE) x110, and b) HE x220.**

appeared 6 months after the application.

Findings of his neurological examination were left straight leg raising test positivity at 30 degrees, paresis of left great toe dorsiflexion with 4/5 muscle strength, and hypoesthesia at the left L5 dermatome. Lumbar magnetic resonance imaging (MRI) revealed a lesion mimicking left L4-5 disc herniation. The lesion was hypointense on T1-weighted and hyperintense on T2-weighted MRI sections and it compressed the left L5 nerve root on the L4-5 disc space level (Figure 2).

It was seen in the operation that the lesion compressing the L5 root was the over-hydrated hydrogel implant that spilled over into the spinal canal from the disc space (Figure 3). It was removed, and the patient's severe leg pain and paresis completely disappeared.

## Discussion

Hydrogel implants are new minimally invasive devices that allow to restore the degenerated nucleus pulposus for treatment of lumbar disc disease. Various devices developed from different materials are on the market, and there are some more that are still under study (1,2). The main aims of these smart devices are to restore the disc height and to widen the neural foramen. Through these mechanisms, they lessen both axial and radicular pain.

However, the devices may also cause some serious complications. We report a case with nerve root compression due to a previously implanted hydrogel spilling over into the spinal canal. There are also two case reports in the literature with a similar complication (3,4). In our case, as in the case reported by Durdag et al. (3), the lesion was seen as hypointense on T1-weighted and hyperintense on T2-weighted MRI

images, probably because of their high water content. In the case reported by Akgun et al. (4), MRI could not be performed after hydrogel implantation because of the patient's claustrophobia. In our case, there was a wide-based disc herniation, probably with a wide annulus fibrosus defect (Figure 1). This finding was thought to imply that the wide annular defect might cause the spilling-over of the hydrogel implant into the spinal canal. In the other two reports, the width of the annular defects could not be evaluated because of a lack of the axial sections of the MRI before application of the implants.

In conclusion, application of hydrogel implants into degenerated intervertebral discs may be a simple and effective method. However, they must be used in selected cases to avoid complications. Presence of a wide annular defect before application may cause a spill-over of the material into the epidural space and a development of neural compromise due to compression of the root and the dural sac.

Contribution Categories	Name of Author
Follow up of the case	A.T., A.T., F.K.G., B.E., O.Y.A., E.C.
Literature review	M.O., B.E., F.K.G., I.G., A.T., A.T.
Manuscript writing	O.Y.A., E.C., M.O., B.E., I.G., A.T.
Manuscript review and revision	F.K.G., A.T., I.G., O.Y.A., E.C., M.O.

**Conflict of Interest:** The authors declared no conflict of interest.

**Financial Disclosure:** The authors declared no financial support.

## References

1. Bowles RD, Setton LA. Biomaterials for intervertebral disc regeneration and repair. *Biomaterials* 2017;129:54-67. [\[CrossRef\]](#)
2. Schmocker A, Khouhabi A, Frauchiger DA, Gantenbein B, Schizas C, Moser C, et al. A photopolymerized composite hydrogel and surgical implanting tool for a nucleus pulposus replacement. *Biomaterials* 2016;88:110-119. [\[CrossRef\]](#)
3. Durdag E, Ayden O, Albayrak S, Atci IB, Armagan E. Fragmentation to epidural space: First documented complication of Gelstix(TM.). *Turk Neurosurg* 2014;24(4):602-605.
4. Akgun B, Ozturk S, Cakin H, Kaplan M. Migration of fragments into the spinal canal after intervertebral polyethylene glycol implantation: an extremely rare adverse effect: Case report. *J Neurosurg Spine* 2014; 21(4):614-616. [\[CrossRef\]](#)