

Case Report

Case of the week: Updating a cervical MR scan avoided unnecessary cervical surgery

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Received : 21 December 2020

Accepted : 29 December 2020

Published : 30 March 2021

DOI

10.25259/SNI_931_2020

Quick Response Code:



ABSTRACT

Background: As spinal surgeons, we have all likely seen cases in which lumbar disc herniations regressed/resolved on successive MR studies. Here, we present a patient whose original cervical MR showed a large C4-C5 cervical disc herniation that completely resolved on the follow-up MR obtained 9 months later, thus avoiding cervical surgery.

Case Description: A young patient (e.g. <30 years old) sustained multiple prior traumatic events over the past 3 years. The last episode 9 months ago resulted in the performance of an MR scan that demonstrated a significant central C4-C5 disc herniation with cord/root compression. Despite pain and mild radiculopathy, the patient had no focal neurological deficit, and did not undergo surgery. When the patient recently consulted multiple spinal orthopedists and neurosurgeons, the uniform recommendation was for a C4-C5 anterior cervical discectomy/fusion (ACDF). However, a telemedicine consultation with a spinal neurosurgeon resulted in a follow-up cervical MR scan that demonstrated cervical disc resorption, and, therefore, no need for cervical surgical intervention. When the new study showed full resolution of the C4-C5 disc, the telemedicine and local neurosurgeon agreed that cervical surgery was unnecessary.

Conclusion: The spinal literature shows that predominantly lumbar disc herniations (LDH) spontaneously regress on MR studies 34.7–95% of the time over 6–17 month intervals, with full resolution being seen in 43–75% of cases. As cervical disc herniations likely demonstrate similar resorption/resolution on successive MR studies, old cervical MR examinations should probably be updated/repeated in patients who are being considered for cervical surgical intervention. If/when cervical discs have resorbed, cervical surgery may be avoided.

Keywords: Cervical spine, Non-surgical, Spontaneous disc resolution, Surgery, Unnecessary, Updated MR

INTRODUCTION

Most spinal surgeons have likely seen cases in which successive MR studies documented the spontaneous regression/resorption of cervical/lumbar disc herniations. The spinal literature focuses on lumbar disc herniations (LDH) that demonstrate spontaneous regression on MR studies 34.7–95% of the time over 6–17 months intervals, with full resolution being seen in from 3–75% of cases. Here, we present a young patient with an original large central C4-C5 disc herniation with significant cord/root compression whose subsequent MR obtained 9 months later showed complete resolution that avoided cervical surgery.

CASE STUDY

A young patient (e.g. under 30 years of age) had a history of multiple prior traumatic events over the last 3 years. Trauma 10 months previously led to a cervical MR 9 months ago; it demonstrated

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a large central disc herniation at the C4-C5 level [Figures 1 and 2]. Although the patient complained of pain with radiculopathy, she had no significant focal neurological deficits, and was, therefore, managed conservatively.

Six months later, still with complaints of pain and radiculopathy but no focal neurological deficit, the patient was seen by several spinal orthopedists and neurosurgeons; they uniformly recommended a C4-C5 ACDF (anterior cervical discectomy/fusion). However, the patient's telemedicine neurosurgical consultant recommended obtaining a repeat cervical MR. When this study was performed, it documented full resolution of the C4-C5 disc herniation. Both the telemedicine and neurosurgeon at a local academic medical

center concluded that no cervical surgery was indicated. [Figures 3 and 4]. Rather, the patient was referred to neurology for continued conservative management.

DISCUSSION

Regression versus resolution of lumbar disc herniations

Spinal disc herniations on MR studies have been shown to regress in up to 34.7–95% of cases over 6–17 months' duration, with full resolution being seen from 43–75% of the time (e.g. ± 7.2 mos.) [Table 1].^[2,5,7] In 2004, Splendiani *et al.* reviewed 64 patients with MR-documented disc herniations at 72 levels; within 6 months, there was spontaneous regression in 34.7% of cases, with sequestered discs regressing 100% of the time.^[7] Chiu *et al.* in 2015 reviewed 31 studies focusing on the conservative/non-surgical management of LDH; this excluded any patients with a history of surgery, infections, tumors,

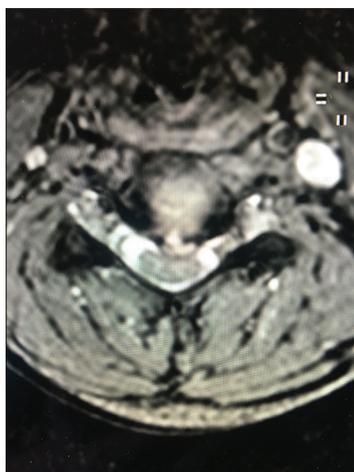


Figure 1: The original C4-C5 axial cervical MR study obtained 9 months earlier showed a large central disc herniation at the C4-C5 level. Focal hyperintensity within the disc compressing the ventral cord is readily seen on this image.



Figure 2: The midline sagittal MR obtained 9 months earlier demonstrated the central C4-C5 cervical disc herniation with significant ventral cord compression.

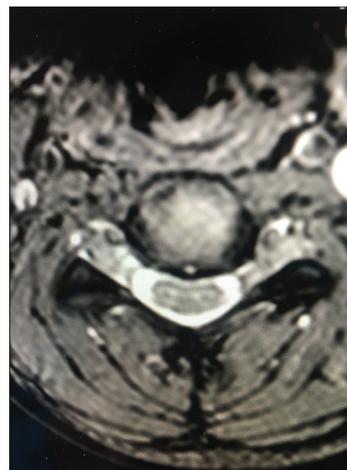


Figure 3: The axial cervical MR obtained on follow-up 9 months later demonstrated complete resolution of the C4-C5 herniated disc.

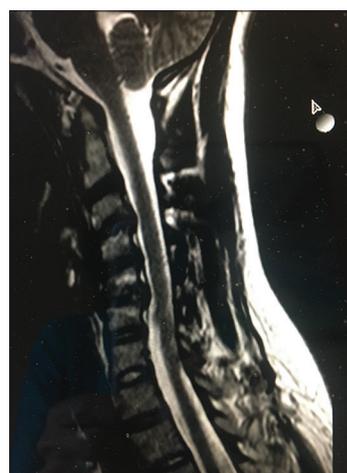


Figure 4: The midline sagittal MR obtained 9 months later showed full resolution of the prior C4-C5 central disc herniation.

Table 1: Summary of literature on resolution/regression of spinal disc herniations.

Author Ref Year	# Cases	Types of cases	Original MR	Follow up MR	Resolution of disc %
Splendiani <i>et al.</i> ^[7] 2004	Spot Res/Reg LDH Literature 70% LDH Reg Indicators	MR Contrast Document LDH Res/ Reg 64 patients 72 LDH MR ±Contrast Con Rx-MR F/O 6 mos	Spont Reg LDH 34.72% Seq Reg 100% Most LDH High Signals on T2 Reg 85.18%	Peripheral Enhancement 83% LDH Reg not Due to: Location, Size Level	MR had Predictive Information LDH Res/Reg
Steffen <i>et al.</i> ^[8] 2014	Spont Reg LDH on MR in Dog	3 yo French Bull Dog Acute LBP Hyp	Ext LDH L34 Cons Rx NSAIDS Restrict Ex	5 weeks later com res clinical signs	Rep MR 69% Reg Volume of LDH
Chiu <i>et al.</i> ^[2] 2015	Spont Reg LDH Review 31 studies Cons Rx-2 MR- No OP	Excluded: infections Tumors DS or ST 2 Indep Rev	Spont Reg 96% Seq LDH 70% Ext LDH 41%	Protruding LDH 13% Total Res 43% Seq 15% Ext	Spont Reg LDH with Con Rx Moreso Seq vs. Ext LDH
Hong <i>et al.</i> , 2016	28 Pts 2 MR 2012-14 Reg massive LDH on MR	2 Pain Rx TFESI 4/28 Reg LDH Rate 59%	4 Pts No Reg LDH on MR but Sx Imp- No Surgery	Massive LDH Reg Variable Points 3–21 mos	TFESI Helped with Massive LDH without Severe ND
Jung <i>et al.</i> ^[4] 2017	Case Report 32 yo F Huge LDH	CE Syndrome Refused Surgery	CT and MR NO changes 3, 6, 12 mos CA TDH	18 mos Delayed Reg	2 Yrs Comp Res
Oligane <i>et al.</i> ^[6] 2018	CR CA TDH 40 yo F	Spont Res	MR T45-T9/10 CC+Syr	F/O 6 mos Comp Res CA TDH/ Dec Syr	Spont Res 6 mos CA TDH T56 level
Babashahi <i>et al.</i> ^[11] 2019	CA TDH Spont Res CR:8 yo F LBP Hyp	CC Syr Cons Rx Studies CT Huge CA TDH T56	3 G 1 Non Reg 2 Par Reg 3 Com Rex	1–4 Pts (10%) 2–6 Pts (15%) Par Imp	3–30 Pts (75%) G3 Imp NRS and ODI
Kesikburun <i>et al.</i> ^[5] 2019	LDH Spont Res 2015-18 40 Pts NRS, ODI	Ext LDH on MR Time 17±7.2 Mos Con Rx			

Spont: Spontaneous, Res: Resolution, LDH: Lumbar disc herniation, MR: Magnetic resonance imaging, CT: Computed tomography, Imp: Improvement, ODI: Oswestry disability index, NRS: Numeric rating scale for pain, Con: Conservative, Rx: Treatment, Rep: Repeat, Pts: Patients, Seq: Sequestered, Ext: Extruded, mos: Months G: Groups, Par: Partial, Com: Complete, CA: Calcified, TDH: Thoracic disc herniation, CR: Case report, LBP: Low back pain, Hyp: Hyperreflexia/spasticity, CC: Cord compression, Syr: Syring, F/O: Follow-up, Dec: Decreases, yrs: Years, Reg: Regression, CE: Cauda equina, TFESI: Transforaminal epidural steroid injection, Sx: Symptoms, Imp: Improved, ND: Neurological deficits, DS: Degenerative spondylolisthesis, St: Stenosis, Indep: Independent, Rev: Reviewers, Ex: Exercise, OP: Surg

degenerative spondylolisthesis, or stenosis.^[2] Spontaneous regression of LDH was observed in 96% of cases; 70% for sequestered LDH, and 41% for extruded LDH. Of interest, total resolution of discs was most frequently encountered in those with free/sequestered disc fragments (43%), and a lesser 15% for those with extruded discs. Subsequently, in 2019, Kesikburun *et al.* demonstrated spontaneous resolution of LDH on successive MR studies performed in 40 patients followed over an average interval of 17 +/- 7.2 months.^[5] Patients were divided into 3 groups: Group 1 showed no regression of the LDH (4 patients-10%), Group 2 demonstrated partial

regression of LDH (6 patients-15%), while Group 3 patients exhibited complete resolution of LDH (30 patients-75%). Notably, progression/resolution of discs positively correlated with clinical improvement utilizing the numeric rating scale for pain (NRS), and the Oswestry disability index (ODI).

Case report of delayed LDH regression/ resolution

In Jung *et al.* study (2017), a 32 year old with a large LDH had refused surgery despite the presence of a cauda equina syndrome [Table 1].^[4] The successive CT and MR studies

showed no significant changes at 3, 6, and 12 months. However, finally 18 months later, the MR demonstrated delayed disc regression, followed by complete resorption at 2 years. Of interest, clinical symptoms/signs similarly regressed/resolved over this 2-year interval.

Case reports of calcified thoracic disc herniations (TDH) spontaneously resolving

In two cases, large calcified thoracic disc herniations (TDH) responsible for significant myelopathy spontaneously resolved [Table 1].^[1,6] In the first study by Oligane *et al.* (2018), a 40 year old female with significant cord compression experienced the spontaneous resolution of a large calcified TDH and myelopathy over an 8 month period.^[6] In a second case report, Babashahi *et al.* (2019) presented an 8 year old female with significant myelopathy who originally presented with a large calcified T5-T6 thoracic disc herniation resulting in marked cord compression, and syrinx formation.^[1] The original MR showed an intrinsic hyperintense cord signal extending from the T4/5-T9/10 levels. Spontaneously, six months later, without surgical intervention, the patient's myelopathy resolved as did the calcified disc complex; both intrinsic/intramedullary cord changes and the attendant syrinx regressed.

Regression of LDH with transforaminal lumbar epidural injections (TFESI)

In 2016, Hong *et al.* evaluated 28 patients with massive lumbar disc herniations seen on original MR studies; of interest, none had severe neurological deficits [Table 1].^[3] Patients were uniformly treated with transforaminal lumbar epidural steroid injections (TFESI) that were performed over varying intervals (next 3-21 months): 59% of discs regressed on subsequent MR studies.

Veterinary observation of spontaneous LDH regression in a dog

Steffen *et al.* (2014) originally observed a large L3-L4 LDH on an MR performed in a 3 year old French bulldog who presented with a cauda equina syndrome [Table 1].^[8] Interestingly, 5 weeks later, the subsequent MR showed the disc volume had spontaneously regressed by 69%, and the dog's deficit similarly improved.

Resolution of C4-C5 cervical disc in this case

In this young patient (<30 years of age), the original cervical MR performed 9 months ago had demonstrated a significant central C4-C5 disc herniation with resultant spinal cord and bilateral nerve root compression. This case highlights the need to obtain updated/new MR studies within a reasonable interval, (e.g. within 3-4 months) following an

original MR study. Up-dated MR examinations should then confirm whether there is a persistent significant cervical disc herniation warranting cervical surgical intervention.

CONCLUSION

Here, we report how a young patient (<30 years of age) showed, on successive MR studies (i.e., 9 months apart), complete resolution of a significant C4-C5 disc herniation, thus avoiding cervical surgery.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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How to cite this article: Epstein N. Case of the week: Updating a cervical MR scan avoided unnecessary cervical surgery. *Surg Neurol Int* 2021;12:134.